Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES

VOL. VI.---NO. 11. NEW YORK, MARCH 15, 1862. NEW SERIES.

Engine With Walbridge's Cut-off.

The accompanying engraving represents a steam engine with an improved cut-off invented by A. S. Walbridge. The engine is of the ordinary construction embracing the latest improvements, and is a sample of those manufactured by C. C. Whittelsy of Malone, N. Y.

The several parts will be readily understood by an inspection of the cut. A is the foundation stone, B B′ B″ is the cast bed on which the other parts are mounted, C is the cylinder head or end, D is the steam jacket surrounding the cylinder, E is the cross head, F F are the guides, G is the connecting rod, H is the crank, I the shaft, J the fly wheel, K the eccentric, L the valve rod, M M the steam pipe, N the exhaust pipe, O the throttle valve, P the oil cup for valves and cylinder, Q the safety valve, and R the boiler.

The cut-off belongs to that class in which there are two slide valves riding on the back of the main slide valve. The steam chest, S, is represented with the front plate removed to show the interior. Two horizontal posts, *a a*, are attached rigidly to the main slide valve, and are connected by rods, *b b*, with levers, *c c*, which are connected at their opposite ends by pin joints with the cut-off valves.

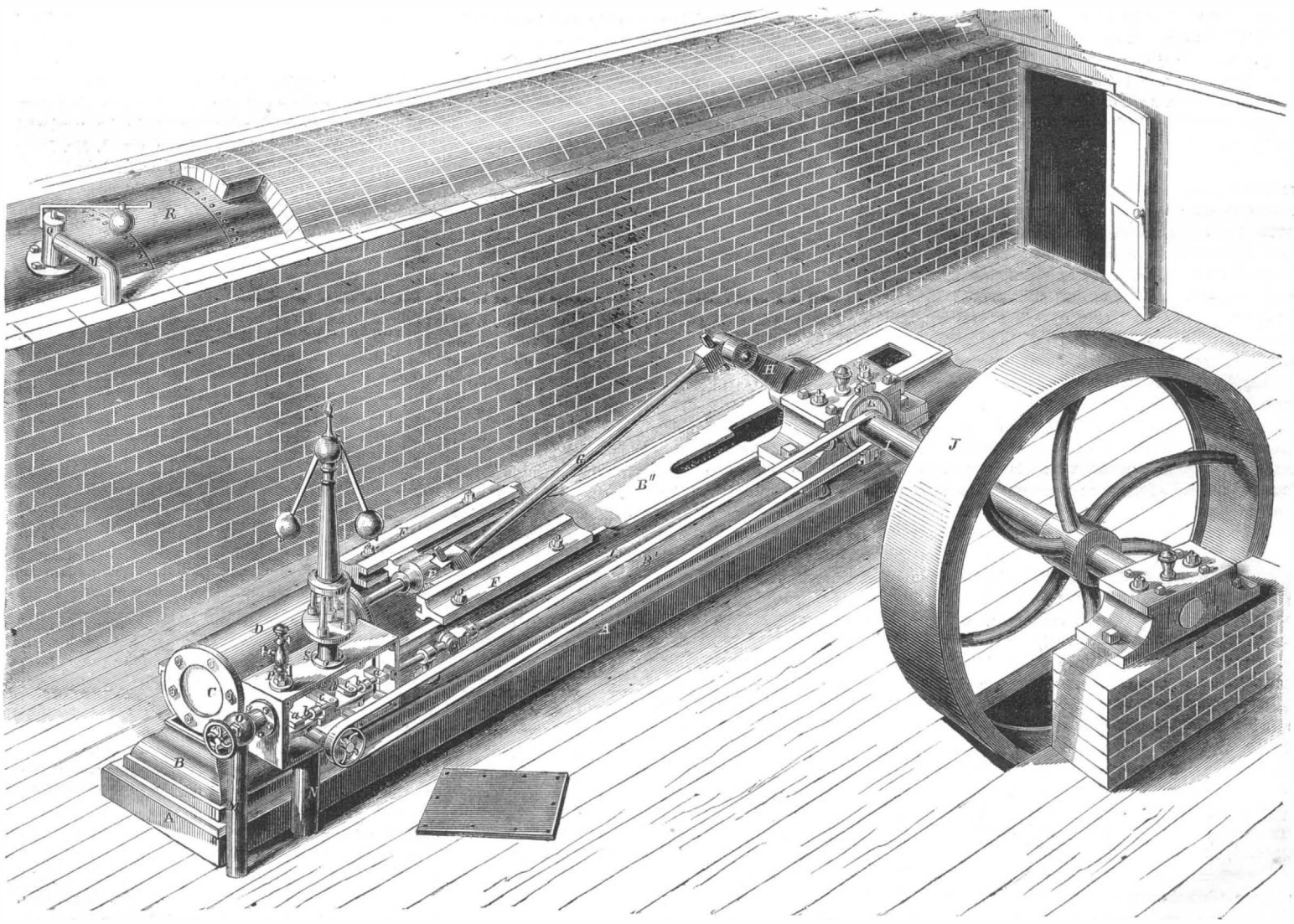
Between the two levers, *c c*, is the wedge, *d*, which may be moved vertically by the governor, with which it is connected by a rod passing through a stuffing box. The edges of this wedge are the fulcra of the levers, *c c*. It will be seen that if the wedge, D, is lowered, the levers will strike it at an earlier part of the stroke, and will, consequently, close the cut-off valves earlier, while if the wedge is raised, the steam continues to enter the piston during a larger portion of the stroke.

The length of the rods, *b b*, is made variable, and may be altered by turning the cylinders, *e e*, to adjust the cut-off. The horizontal projections upon the lower end of the wedge, *d*, are provided for the purpose of stopping the engine, in case the governor or its driving belt should break; thus preventing the engine on being released from the control of the governor attaining a dangerous speed. As the governor's arms drop, the wedge is raised so as to bring these projections against the levers, and thus to cut off the steam as early as to stop the engine.

When the engine is heavily loaded so as not to cut off any part of the first half of the stroke, the valves give steam the same as with the link motion, that is by partly leaving the port open; the steam following a feeding full stroke; though the engine should be large enough to drive the work without this, as this prevents all expansion, and a loss of steam is the result. It is convenient, however, in case of necessity, where heavy work is required for a few minutes.

This invention has been secured by Letters Patent in Canada and the United States; the United States Patent having been granted, through the Scientific American Patent Agency, Sept. 10, 1861. Any further information in relation to the patented portion of the engine may be obtained by addressing the inventor, A. S. Walbridge. For information in relation to the purchase of engines with these improvements, address the manufacturer, C. C. Whittelsy, at Malone, N. Y.

WALBRIDGE'S VARIABLE CUT-OFF.



To Recognize Grape Sugar beside Cane Sugar.—O. Schmidt employs triacetate of lead and ammonia, says the *Ann. der. Chem. und Pharm.*, which produce with both sugars, white precipitates, which, after a while, particularly when heated, assume a red color in the presence of grape sugar, but remains unaltered by cane sugar; a small quautity of the former mixed with a large proportion of the latter may thus be recognized by the red tint of the precipitate.

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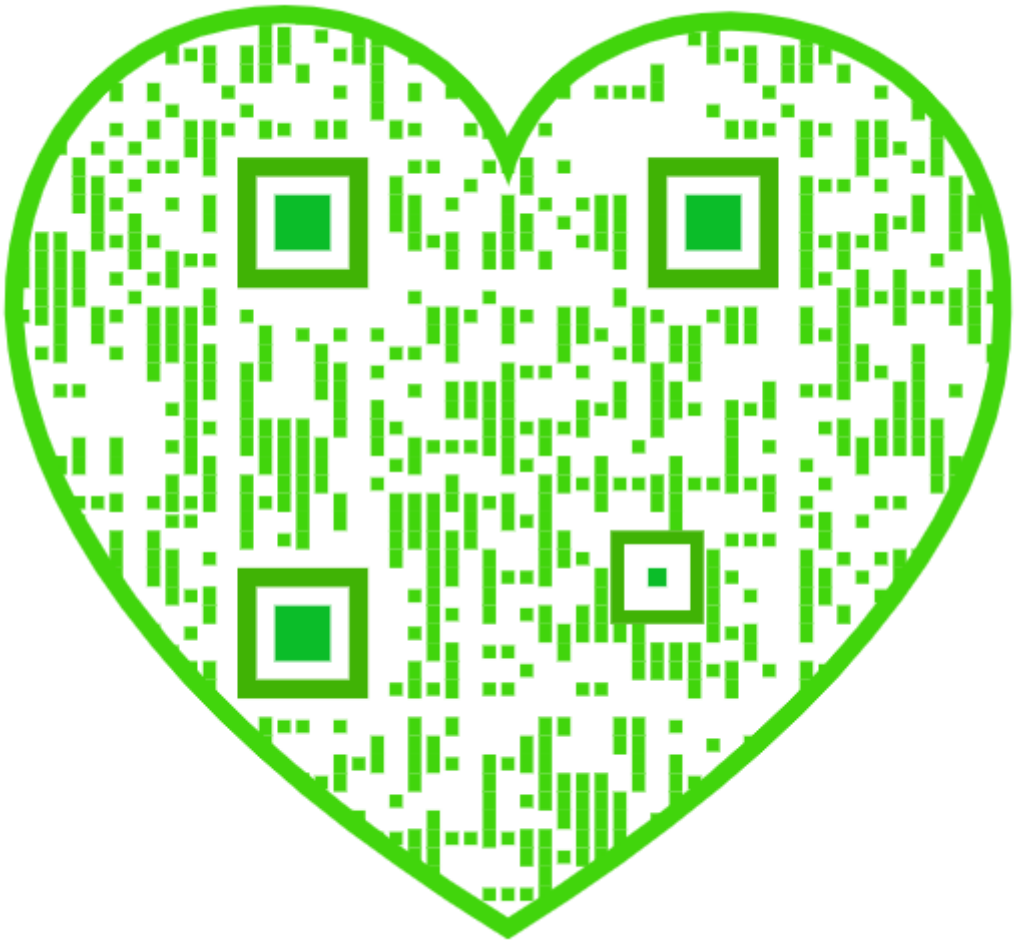

NOTES ON MILITARY AND NAVAL AFFAIRS.

When Gen. McClellan was called to the command of the Army of the Potomac he sought to restrain within reasonable limits the freedom of the press in the publication of military intelligence. There was no attempt at coercion, but journalists were appealed to to coöperate as far as possible to aid the government in suppressing the rebellion. Previous to the battle of Bull Run, which resulted so disastrously to our arms, every conceivable item of news concerning army movements was promptly spread before the public in the daily and weekly newspapers, and when the brave Gen. McDowell began his march toward Manassas all his movements were minutely described in sensation reports, so that all the enemy needed in order to know just what was doing to defeat him was to procure a file of some daily paper, and the whole story was before him. With the increase of the army, and conscious of the growing strength of the government, the press began less and less to respect the wishes of Gen. McClellan, and in its desire to gratify the intense thirst of the people for news, a return was had to the old sensation system of publishing everything that came within its reach. Jeff. Davis needed no spies to ferret out the operations of the government: the press told all, and a great deal more than proved on investigation to be true. The government has found at last that a reasonable censorship over the press was necessary, and accordingly it has issued an interdict which will in some measure prevent a premature publication of important military intelligence. The situation of the country is now exceedingly interesting, and there is no doubt that still greater movements are on foot than have yet transpired. A good deal of general information respecting them has been received in this city; but, with a desire to support the government to the fullest extent, we think all our cotemporaries should exercise extreme caution and respect for the mandates of the government.

Our summary of intelligence respecting military and naval matters will relate chiefly to what has transpired, and not to what the Government is intending to do. A few days more of patient waiting will reveal some gigantic operations. The city of Nashville is now occupied by the Federal forces under General Buell, and the flag of the Union is floating once more from the dome of that Capitol city.

The Confederate forces under Gen. Johnston were falling back at last accounts, on the line of the railroads toward Chattanooga, which is close on to the Georgia line. His forces are represented as discouraged and demoralized by the disasters which have attended them. Where they may finally make a stand, it is impossible to guess. With a view to secure the best interests of the cheated and deceived people of Tennessee, the President has appointed Hon. Andrew Johnson, now Senator from Tennessee, and one of the "noblest Romans of them all," Brigadier General and provisional Governor. He will repair at once to Nashville to organize a State government, and arm and protect the loyal citizens of that State, and will be furnished by the government with fifty thousand stand of arms for that purpose.

The gunboats that were disabled at Fort Donelson are completely repaired, and the *Carondelet*, which received fifty-four shots in that fight, had the impudence a week afterward to threaten Columbus. The *Pittsburgh*, which was deprived of her rudder, and damaged in other respects, went on to the ways one day, and came off on the next, "spiling for a fight."

Within one day last week, 20,000 troops arrived and departed from Cairo, and it is said that General Pope would lead 25,000 upon New Madrid, a town on the Mississippi river in the southeast corner of Missouri. The greatest activity prevailed throughout all the West, and blow after blow will be struck in good sledge-hammer style; we trust always with success.

Columbus, Ky., the proclaimed Gibralter of the Mississippi, is no longer tenable. After an immense amount of labor and expense in fortifying this naturally strong position, and which was placed under command of the pet General Beauregard, has been evacuated, and is now occupied by the Union forces. This event took place on the 4th inst. under direction of General Cullum, Chief Engineer of General Halleck's staff. It is said that rats always flee from a falling barn; thus it is with the Confederates. The roof of their edifice was knocked in at Forts Henry and Donelson, and out they run from their hiding places as fast as their legs can carry them. They threaten to make a stand at island number 10 in the Mississippi, 45 miles below Columbus, but it will not avail; the river must be cleared. Halleck and Foote will be after them with a sharp stick, and we may hope that ere long the "father of waters" will be free from obstruction, and our deluded fellow citizens return once more to their duty. Nobody knows where General Price is. He is fleeing before Gen. Curtis's forces far down into Arkansas.

Thusmuch for the Western department. Turning to the Eastern divisions, Major General Banks's forces have successfully crossed the Potomac at Harper's Ferry. This was accomplished on Tuesday, the 25th ult, and they have now possession of Bolivar, Loudon Heights, and Charlestown, the few rebel troops retiring as the Government troops advanced. There were but few inhabitants left in that country, and these were in a state almost of starvation. Refugees are now beginning to return to their homes.

The crossing was accomplished by means of a pontoon bridge, no accident resulting therefrom. General McClellan superintended this movement in person, and his appearance among the troops on the Virginia side, was attended with demonstrations of joy. He is a magnetic man, and has a strong hold upon the confidence and affections of his troops.

The Savannah *Republican* not only admits that the communication between Fort Pulaski and Savannah is wholly cut off but declares that the Unionists have erected three batteries on the river in the form of a triangle which it is impossible for any vessels in the rebel service to pass.

The military committee of the senate has reported favorably upon a bill to establish a national foundry, fixing its location on the tide water of the Hudson river. This is right and proper. There should be an establishment of this kind near this city.

A gentleman from Hunter's Bottom, in Kentucky, states that the cannonading at Fort Donelson was distinctly heard at that point. It is 200 miles in a straight line from Fort Donelson. The sounds were so distinct that the people were of opinion that a great battle was raging at Louisville. The Madison *Courier* also states that the sounds were indistinctly heard at that point. There must have been something of a noise at Donelson.

In looking at a shell after it is finished, many are puzzled to determine, there being but a single little hole in the hollow ball, how the core is taken out. The core is composed of sand and flour, and after being properly moulded and finished is placed in an oven and baked like a loaf of bread until it becomes hard. The hot metal, when it is poured into the mold, burns the flour out, and the sand crumbles so as to be easily taken out.

The St. Louis *Republican* says there are no armed rebel bands in the State of Missouri. The last military vestige of insurrection has been swept away. It declares that the loyalty of Missouri is fixed and immovable, and it is the duty of all her citizens to cheerfully acquiesce, since opposition is fruitless."

It is announced that the United States Collector at Louisville is authorized to make arrangements for opening trade along the Cumberland and Tennessee rivers, the same as before the rebellion, with the exception of articles strictly contraband of war.

Generals Buell, Smith, McClernand, Sigel and Burnside are promoted to the rank of Major Generals, for gallant and meritorious conduct.

Gen. Fredrick W. Lander, a brave and meritorious officer, in command of the forces at the extreme right on the upper Potomac, is dead. He received a wound at the battle of Ball's Bluff, and gradually sunk under its effects. He won fairly his honors, and died like a true soldier, with his sword upon his side. He was a warm personal friend of Gen. McClellan, and the order of the Commander-in-Chief which conveys a notice of Gen. Lander's death to the army is an eloquent and affecting tribute to the memory of the deceased soldier.

Generals Lloyd Tighlmon and Simon B. Buckner, are now safely housed in Fort Warren, Boston harbor. It is to be hoped that their power to do mischief, is effectually barred. The country cannot afford to let go its hold on these men.

Naval Intelligence.

THE ERICSSON IRON-CLAD GUNBOAT—Now called the *Monitor*, which has frequently been noticed in these columns, made a trial trip on the 3d instant, with a view to test the steering qualities, which were found on a previous trial quite defective. She left the Brooklyn Navy Yard in the morning, and steamed down the bay to about five miles beyond Fort Lafayette, returning to her anchorage in the evening. A naval commission, composed of Commodore Gregory, Chief-Engineer Garvin and naval constructor Hart, was appointed to accompany her.

The Commission report that her steering qualities are all that could be desired. One man steers her with perfect facility. She makes a complete revolution, in either direction, within three times her own length, and within five minutes of time. The guns were fired to test the question which had been mooted, of whether the concussion within the turret would not be so great as to injure seriously the ears of the men. First a blank cartridge was fired with the hatches in the roof open. Then a charge of canister, weighing 135 pounds, with 15 pounds of powder, with the hatches still open; and finally the same charge, with the hatches closed, as they will be under the fire of the enemy. It was found that in every case the concussion in every part of the interior of the turret was considerably less than when standing near such a gun fired in the open air. The sailors stationed at the guns, and who expect to handle them shortly against the enemy, all expressed themselves as much delighted at the success of the trial. The speed of the vessel by the ship log was 6¼ knots, the engines making 65 revolutions. It is expected that after the grease gets out of the boilers, so that they will not foam, a considerable increase in the speed will be attained. The engineer of the vessel, Mr. Isaac Newton, reports that the engines work beautifully. The compass in the iron pilot house did not work altogether satisfactorily, but no difficulty is apprehended with regard to its adjustment. The *Monitor* is armed with two 11-inch columbiad guns, and will prove an ugly customer if her machinery works well.

IRON-CLAD SHIP.—The iron-clad vessel, now being constructed by Messrs Cramp & Son of Philidelphia, as we learn from the *Ledger*, is rapidly approaching completion. She is 245 feet long, 57 feet six inches beam and 25 feet hold. From the builders we learn the following details in reference to this vessel. She has two floor timbers to each frame, each 40 feet long, 18 inches deep and 13 inches thick; the balance of the frame is 10 inches thick and tapers from 17½ inches at the floor head to seven inches at the plank sheer. The spaces between the frames are fitted in solid from the keel to the plank sheer, and she is caulked inside and out before the plank is put on. She has eight courses of keelsons 20 inches deep and 14 inches thick, besides the main keelson, which is 20 inches deep and 18 inches sided. This keelson has two 1½-inch copper bolts to each frame, fastened through frame and keel, making over 200 copper bolts four feet six inches long and one and a half inches thick for the main keelson alone. The berth deck clamps and bilge streaks are nine inches in thickness. The gundeck clamps are eight inches in thickness, and those on the spar deck are seven inches thick. On each side of the keel are three courses of gar-board streaks and the planking on the flat of the bottom is five inches thick, gradually increasing in thickness from the turn of the bilge to the iron plating, where it is nine inches. The iron plating will extend the whole length of the strip four feet below the water and three feet above, and for 180 feet amidships will be carried up to the plank sheer. The average thickness of the timber behind this plating will be twenty-one inches. The spar deck will be covered fore and aft with one inch iron plates before the deck plank is put on. In order to prevent any violent rolling of the vessel at sea, there will be three courses of the planking on each bilge projecting outside of the bottom planking ten inches. The ship will be provided with extra steering apparatus so arranged that she can be worked without the rudder, if necessary. The weight of the hull of this ship will be 1,970 tuns, the iron plating 820 tuns, and the total weight, including outfits, machinery, fuel, &c., will be about 3,880 tuns, and notwithstanding this weight, her draft of water will not exceed 15 feet when ready for sea. The machinery for this vessel is being constructed by Messrs Merrick & Sons.

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The iron-clad gunboat built at Mystic, Conn., and described on page 131 of our current volume is now lying at the dock at Green Point. We examined her a few days ago, and were much pleased with the beauty of her model, and with her general appearance. Her armor will doubtless prove effective against any ordinary shells, and probably also against solid shot, except those fired from very heavy cannon. As the sides rise from the water's edge they slope inward, but not at a very sharp angle, probably sufficient, however, to deflect shot at short range; the case in which it would have the most force. The vessel is rigged as a brigantine, and as the standing rigging is of wire rope, it presents a very light appearance. We have little doubt that she will prove a very efficient and serviceable vessel of war.

Cannon Manufacture at Pittsburgh.

During the year past the following ordnance, chiefly of a heavy caliber, as we learn from the *Dispatch*, has been manufactured for the government at the Fort Pitt Works, Messrs. Knapp, Rudd & Co., Pittsburgh, Pa.

Description.	*No.*	*Weight.*
FOR ARMY.		
Twelve-inch rifled columbiad...	1	52,005
Eight-inch howitzers.....	10	25,832
Seven-inch rifled colvmbiad....	1	9,711
Eight-inch columbiads.....	51	438,600
Nine-inch heavy martars.....	80	514,500
Four-and-a-half-inch rifled siege guns.....	20	71,000
Ten-inch columbiads.....	10	161,000
Ten-inch siege mortars.....	44	82,720
Eight-inch siege mortars.....	12	11,280
Total	179	1,366,648
FOR NAVY.		
Eleven-inch Dahlgren shell guns	3	57,390
Nine-inch Dahlgren shell guns..	62	567,300
Thirteen-inch heavy mortars...	14	240,100
150-pounder rifle blocks	9	158,400
80-pounder rifle blocks.....	19	241,300
50-pounder rifle blocks.....	36	306,000
38-pounder rifle blocks.....	47	244,400
Total navy ordnance.....	190	1,814,890
Add army ordnance, as above..	179	1,366,648
Total of all ordnance....	369	3,181,538
PROJECTILES, ETC.		
Nine-inch navy shells.....1,820		125,580
Eleven-inch navy shells..... 829		106,941
Ten-inch navy shells.....1,054		106,454
32-pounder navy shells.....1,027		22,504
Total navy shells.....		361,569
Eight-inch mortar shells.....1,000		40,000
Ten-inch columbiad shells.....1,000		101,670
Nine-inch shells.....1,600		110,400
Thirteen-inch mortar shells 6,000		1,890,000
42-pounder rifled shells..... 700		34,300
24-pounder shot.....3,000		69,000
12-pounder shells..... 600		3,600
12-pounder spherical case shot.1,600		9,600
24-pounder spherical case shot. 800		14,400
12-pounder shot.....1,200		13,200
6-pounder spherical case shot.1,000		6,004
Total.....		2,301,170
Eight-inch mortar beds.....	6	4,800
Ten-inch mortal.....	10	18,000
		2,323,970
Add weight of guns.....		3,181,538
Total.....		5,505,508
Add navy shells.....		361,569
Total weight.....		5,867,077

Or 2,938 tuns of iron, nearly.

The extraordinary demand did not begin until the middle of April, 1861, and since that time the capacity of the works has been constantly increasing. The additions now making to the buildings will give a capacity many times greater than that comprehended in the above statement.

TREASURY NOTES BY THE CART LOAD.—Some curious experimental philosopher, it seems, has taken the trouble to measure bodily a certain portion—less than one-third—of the huge mass of government credit which our city banks in the last summer and autumn so loyally agreed to shoulder. Twenty-one millions of the amount in treasury notes at 7.30 interest, have just been delivered to the banks by Mr. Cisco, the sub-treasurer. They are found to consist of 72,829 separate obligations, in various denominations, from $50 to $5,000. By careful measurement they are ascertained to form a column of notes, piled singly, twenty-seven feet high, and moreover made a large load for the cart.

MIDDLINGS cotton are selling at 24 and 25 cents per lb. The market is dull and there has been a decline from the prices which prevailed a month ago.

FULMINATING SUBSTANCES.

In a variety of chemical combinations, it happens that one or more of the principles assume the elastic state with such rapidity, that the stroke against the displaced air produces a loud noise. This is called fulmination, or more commonly detonation.

Simple fulminating powder is made by triturating in a warm mortar, three parts by weight of niter, two of carbonate of potash, and one of flowers of sulphur. These substances should be triturated separately, then mixed. Its effects, when fused in a ladle, and then set on fire, are very great. The whole of the melted fluid explodes with an intolerable noise, and the ladle is commonly disfigured, as if it had received a strong blow downward.

If a solution of gold be precipitated by ammonia, the product will be fulminating gold. Less than a grain of this, held over the flame of a candle, explodes with a very sharp and loud noise. This precipitate, separated by filtration, and washed, must be dried without heat, as it is liable to explode with no great increase of temperature; and it must not be put into a bottle closed with a glass stopple, as the friction of this would expose the operator to the same danger.

Fulminating silver may be made by precipitating a solution of nitrate of silver by lime water, drying the precipitate by exposure to the air for two or three days, and pouring on it liquid ammonia. When it is thus converted in a black powder, the liquid must be poured off, and the powder left to dry in the air. It detonates with the gentlest heat, or even with slightest friction, so that it must not be removed from the vessel in which it is made. If a drop of water fall upon it the percussion will cause it to explode.

Brugnatelli made a fulminating silver by powdering a hundred grains of nitrate of silver, putting the powder into a glass, and pouring on it, first, an ounce of alcohol, then as much concentrated nitrous acid. The mixture grows hot and boils. By degrees the liquor becomes milky and opaque, and is filled with small white clouds. When all the grey powder has taken this form, distilled water must be addedimmediately to suspend ebullition, and prevent the matter from being redissolved. The white precipitate is then collected on a filter, and dried. The force of this powder greatly exceeds that of fulminating mercury. It detonates in a tremendous manner on being scarcely touched with a glass tube, the extremity of which has been dipped in concentrated sulphuric acid. A single grain placed on a lighted coal makes a deafening report.

A hundred grains of mercury are dissolved with heat in an ounce and a half by measure of nitric acid. The solution, when cold, is poured on two ounce measures of alcohol, and heat applied till an effervescence is excited. As soon as the precipitate is thrown down, it must be collected on a filter, that the acid may react on it; then washed and dried by a very gentle heat. It detonates with a very little heat or friction.

Three parts of chlorate of potash, and one of sulphur, triturated in a metal mortar, cause several successive detonations, like the crack of a whip, reports of a pistol, or the fire of musketry, according to the rapidity and force of the pressure employed. A few grains, struck with a hammer on an anvil, explode with a noise like that of a musket, and torrents of purple light appear round it. Thrown into concentrated sulphuric acid, it takes fire, and burns with a white flame, but without noise.

Six parts of the chlorate of potash, one of sulphur and one of charcoal, detonate by the same means, but more strongly, and with a redder flame.

Sugar gum, or charcoal mixed with the chlorate, and fixed or volatile oils, alcohol, or ether, made into a paste with it, detonate very strongly by the stroke, but not by trituration.

The chloride of azote is the most wonderful fulminating substance known. It is an oily looking liquid, and a small globule of it no larger than a grain of mustard seed, to which heat was applied in a glass, shivered it to fragments. A small globule thrown among olive oil in a tumbler, produced a most violent explosion, and broke the glass in pieces. A small grain of it when touched with a piece of phosphorus on the end of a penknife, shattered the blade to pieces in an instant. The iodide of azote is also a powerful fulminating substance, and detonates with the smallest shock.

A detonating powder can be made with 1 part by weight of the chlorate of potash, 1 of yellow prussiate of potash, and 1 of dry white sugar, carefully mixed together in a mortar, with a wooden spatula. Each substance should be reduced to powder by itself, otherwise it would be dangerous to pound them together. If to this powder 1 part of sulphur is added, a good percussive powder for guns is obtained.

The fulminating composition for percussion caps, consists of fulminating mercury 3 parts, chlorate of potash 5, sulphur 1, powdered glass 1.

Another kind consists of chlorate of potash 6 parts, sulphur 3, powdered glass 1, and pounded charcoal 1: these parts mean weight, such as one ounce for the unit. The chlorate of potash is exceedingly dangerous when rubbed with sulphur. These fulminating powders are affected by the force applied, and the rapidity of its action.

The British Wool Trade.

The London *Shipping Gazette* publishes some interesting statistics respecting the wool trade. The imports of colonial and foreign wool into England in 1861 prove that the progress of sheep farming in the British colonies has made rapid strides of late years. Although there was a slight falling off in the arrivals of wool last year from Hobart Town, Launceston, South Australia and India, the total supply from British possessions amounted to 329,417 bales, against 308,078 bales in 1860, being an increase of 21,339 bales. The total exports of English, Irish, and Scotch wool last year were upwards of 17,000,000 lbs., against 11,500,000 lbs. in 1860, and the increase in the shipments of foreign and colonial qualities was about 6,000,000 lbs. France stands first as the great consumer of British native wools; and Germany, as well as Belgium, has imported largely. About 30,000 bales of inferior wool have been exported to the United States.

A Splendid Work of Art.

The leading incidents of the present war are soon to be represented to the public by means of probably the most beautiful and effective panorama ever exhibited in this country. On the occasion of a recent visit to the national metropolis we entered the studio of Stanley, the well-known delineator of Indian life, and found that gentleman and Conant, of St. Louis, and Hillyard, of New York, and Lamb, now of Washington, and other eminent artists earnestly engaged on this great work, confident in their belief that it would be received with unprecedented popular applause, a belief in which we most heartily and hopefully concur. Art, which can honor every subject it commemorates, is itself honored when devoted to promoting the *amor patriæ* of the American people in this hour of anxiety and depression.

MOTION OF ELECTRICITY.—The mode by which the rate of motion of electricity was obtained by Prof. Wheatstone, is so curious that it deserves to be described. He caused the electricity from the common machine to pass through a long coil of insulated wire, in which were two or more breaks across which sparks must necessarily pass. A mirror was made to revolve with immense rapidity before this coil. The reflection of the sparks was thus thrown occasionally, when the mirror was in the right position, upon a canopy above, graduated in divisions. The reflection of one of the sparks was found always to lag behind the other, on account of the time occupied by the electricity in passing through the intervening portion of the coil, the effect of which was multiplied by the revolving mirror. The length of the coil between the breaks and the rate of revolution of the mirror being known, and the distance of the reflected sparks from each other being observed, the rate of motion of the electricity was easily calculated.

TOO LARGE A CONTRACT.—Jefferson Davis, in his inaugural message, says "events have demonstrated that the government had attempted more than it had power successfully to achieve." Instead of seizing Washington, sacking Philadelphia, and carrying the Confederate flag over the roof of old Fanueil Hall itself, he acknowledges, and facts demonstrate, that he cannot hold his own. He evidently feels that he has taken too large a job.

A 10-INCH round shot weighs 136 pounds.

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SUBMARINE TORPEDOES—INFERNAL MACHINES.

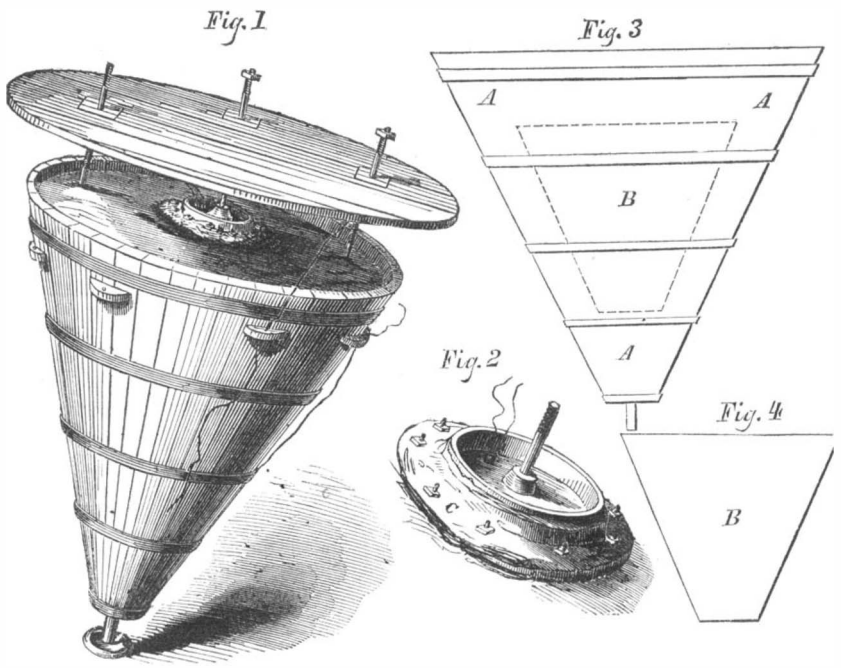
The destruction of our enemies' ships-of-war while attempting to enter harbors and ascend rivers, by means of submarine explosions, has occupied the attention of many distinguished men. The idea is but an extension of the old system of spring-mining which has been pursued in the defense of cities from the very discovery of gunpowder. But so far as we know, Robert Fulton was the first inventor who gave practical form to devices for this purpose. In 1804 he was introduced to the British Minister, William Pitt, and explained to him a drawing which represented a submarine torpedo. Some of these destructive agents were furnished to a British squadron which besieged a French fleet in the bay of Boulogne, and several boats were fitted out one night to use them. They threw the torpedoes under the bows of two French gun-brigs, but they exploded without effecting any other object than that of frightening the crews of the vessels. Fulton stated that the failure of the torpedoes was caused by their having been improperly applied, and he afterward proved this assertion to be correct, by blowing up a strongly built brig of 200 tuns burden in front of Walmer castle, where Mr. Pitt then resided.

The torpedo lifted the brig almost entirely out of the water, and broke her in two. In 1806, Mr. Fulton, after a long sojourn in Europe, arrived in New York, and soon afterward brought the subject of his torpedo before Mr. Madison, who was then Secretary of State, and Mr. Smith, the Secretary of the Navy. He was authorized to make a torpedo and apply it, with which, on the 20th of July, 1807, he blew up the hull of a large brig in New York harbor. This torpedo consisted of a copper case containing one hundred pounds of powder, and a musket lock operated by clock work to run a definite period before the hammer was struck. Fulton delivered several lectures on the subject of marine-torpedoes and they seem to have excited even more enthusiasm in his mind than his steamboat. On one occasion he invited the City Fathers of New York, and a large number of prominent citizens, naval and marine officers, to the fort in Governor's Island to examine his torpedoes, and receive a description of their construction. Having proceeded at some length, he came to the point of description, when he said, "Gentlemen, this charged torpedo under the gate contains 170 pounds of powder, and by drawing this peg, were I to allow this clock work to run fifteen minutes, I have no doubt but it would blow this fortification to atoms." The idea seized a number present that the fort was to be blown up, and such a race then took place as never was before nor since seen on Governor's Island.

These remarks on early torpedoes have been somewhat extended for the purpose of conveying correct historical information respecting what has been done practically with submarine torpedoes. Another project supposed by many to be new at the present day, is that of submarine artillery batteries—firing guns under water. This invention also engaged Fulton's attention. He several times fired a four-pounder, submerged three feet in the waters of the Hudson, and on one occasion he also fired a 100-pounder situated at the same depth. With such a battery he proposed to fire into the hulls of enemies' war vessels under their water-lines, and thus sink them. Such submarine batteries were designed to be carried in war vessels, and when required they were to be hung and slung over their sides, and submerged.

That celebrated British inventor, and naval commander, Lord Cochrane, also constructed several destructive submarine infernal machines, but from the end of the wars of Napoleon until the Crimean war, the subject had a long repose. The British and French fleets having blockaded the bay of Cronstadt, the Russians adopted Fulton's idea, and first sunk a large number of the infernal machines represented in the accompanying figures for the purpose of keeping their harbor clear of foes.

A is the outer case of the infernal machine, B is the inner case containing about 150 lbs. of powder, C is a thick ring of gutta-percha fitting closely to the iron ring above it, and within this are wires for igniting the charge. The outer case is about four feet deep, and three feet across at the top, and made of wooden staves. These torpedoes were sunk in five fathoms water and the wires were connected with a galvanic battery on shore. The charge was intended to be ignited when an enemy's vessel was noticed sailing or lying above a machine. Fourteen of these explosive machines were raised by boats from the fleet, and two exploded nearly under a French steamer. One proved partially effective in slightly injuring a blockading vessel. They had all been sunk too deep to prove very destructive.



RUSSIAN WOODEN-CASED TORPEDO.

These wooden torpedo cases having failed to do injury, the Russians adopted the iron-cased torpedo, represented by the following figures, 1 and 2. A is the iron conical case, anchored at a certain depth by the rope, H, which is attached to the swivel, G, at the apex, B. On the lid, *c*, is a projecting sliding bar, F, sustained by a small spring, *d*. In the center is suspended a tube, *a*, connected with common and percussion powder, and the tube, *a*, was of glass, and contained a detonating compound. When a ship came in contact with the conical case, it swung around until the projecting bar, D, was pressed inward, when the glass tube, *a*, was broken, and the detonating powder was exploded. None of them proved to be infernal machines in practice.

Secessionist desperadoes have lately sought to avail themselves of the apparently destructive powers of these submarine torpedoes. We illustrated the floating fuse torpedo which had been used on the Potomac, on page 101, Vol. V. (new series) Scientific American, and the annexed figure illustrates another very novel torpedo, which has been found in the Tennessee river by Lieut. Phelps, while exploring the channel prior to the gunboat attack on Fort Henry. This torpedo consists of a stout sheet-iron cylinder, pointed at both ends, about five and a half feet long and one foot in diameter. In the interior is a canvas bag, containing seventy pounds of powder. Connected with the upper end is an iron lever, three and a half feet long, armed with prongs, designed to catch in the bottom of the boat to be demolished. The motion of the boat is expected to work this lever sufficiently to move an iron rod on the inside of the cylinder, acting upon the trigger of a lock, which is to explode a percussion cap and fire the powder. The machine is anchored, presenting the prongs on the upper end of the lever in such a way that boats going down stream will slide over them, but those coming up will catch the points and work the lever.

Fig. 1.

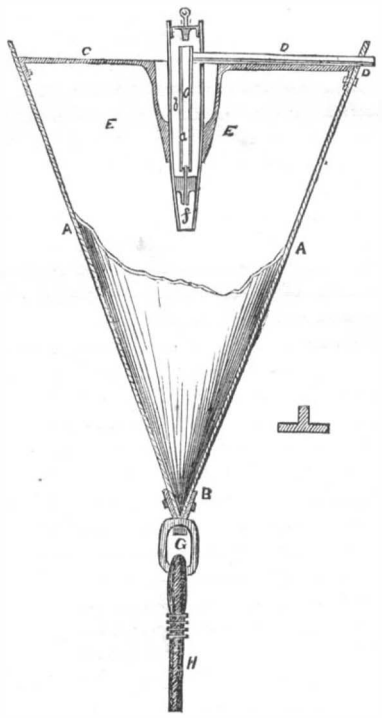
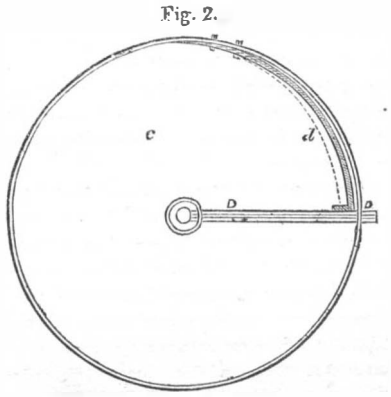
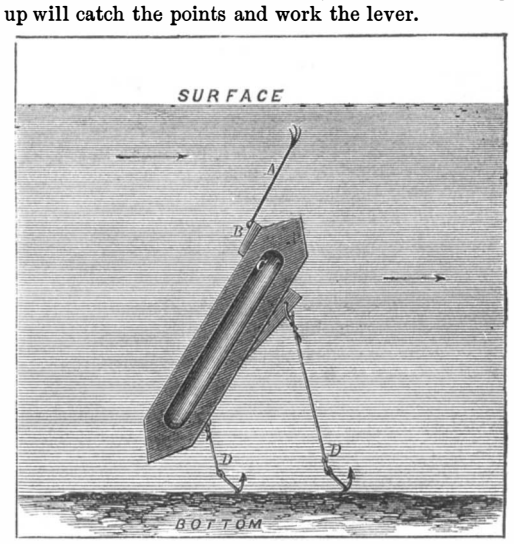


Fig. 2.



Russian Iron-cased Torpedo.



A is an iron rod armed with prongs to fasten upon the bottom of boats going up stream, and acts upon B, a lever connecting with a trigger, to explode a cap and ignite the powder. C is a canvas bag, containing 70 pounds of powder. D, the anchors to hold torpedo in place.

Eight of these were found in the channel, and were designed to blow up the gunboats going to attack Fort Henry. A knowledge of their location was obtained from a secession lady, and Lieut. Phelps dragged for them and drew them up by ropes, at such a distance as to be out of danger, which proved a useless precaution, as not a single one exploded; the powder

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in those he opened was completely soaked and worthless. They were designed to have the prongs come up within a few inches of the surface, but as the freshet had raised the river 25 feet above low water, they were far below.

Several submarine infernal machines have also been sunk in the Savannah river, in order to destroy any of the Union gunboats which might be enabled to pass Fort Pulaski. While Commodore Rodgers was sounding this river he discovered several objects floating upon the surface, which appeared at first sight to be empty tin cans, and as such were not regarded by him as worthy of notice. Lieutenant Sprotson, of the gunboat *Seneca*, hailed him and told him that the objects alluded to were buoys attached to infernal machines. These buoys, five in number, were placed several yards apart in the channel leading from Wright river, and they were connected by spiral wires.

An attempt was subsequently made to produce an explosion by pulling the wires, which failed. The wires were then cut, and the outer buoy was brought off in the gunboat *Unadilla*. In consequence of the delicate nature of the exploding apparatus, and the result of the examination of the buoy brought on board, it was deemed more prudent to sink the remaining buoys rather than attempt to remove them, so that the enemy should not have the satisfaction of feeling that a single life had been lost by the diabolical invention. The buoys were sunk by firing rifle shots into them. The torpedo brought on board the *Unadilla* was afterward set upon a bank, and a rifle ball fired through it, when it exploded.

In reviewing the efforts which have been made to render submarine torpedoes effective against war vessels, the conclusion is forced upon us that the results have entirely disappointed all anticipations respecting their infernal character. They have proven to be entirely worthless and abortive in effecting the destruction of a single vessel in actual warfare. They are plausible submarine demons, and if properly constructed and skillfully managed, may be made effective for harbor defense, but hitherto they have not.

THE CHEMISTRY OF COAL.

Number VII.

PARAFFINE.

We cannot dismiss the subject of the chemistry of coal without a few remarks in relation to paraffine. We have a cake of it now lying before us; and to a person having no idea of the immense variety of substances produced by the combination of carbon and hydrogen it would seem incredible that this cake could have been extracted from coal tar. It is white and translucent, very nearly resembling spermaceti, and is extensively used for making candles. It is especially adapted to this purpose from the large quantity of hydrogen which it contains in proportion to the carbon, the heat generated by the burning of the hydrogen securing a perfect combustion of the carbon, and thus preventing the formation of smoke. The proportion of the hydrogen to the carbon is greater than in any other of the products of the distillation of coal; the formula is C_{20} H_{21}.

The word paraffine—from the Latin *parum*, little, and *affinis*, akin—is given to the substance as descriptive of its most marked peculiarity, which is its small affinity for other substances, whether acids or alkalies. This property of resisting the action of acids and alkalies is causing it to come into use for many purposes. If a lump of potash is wrapped up in common paper the paper is soon destroyed; but if the paper is saturated with paraffine, the potash will not act upon it. Acids in bottles with glass stoppers sometimes decompose the glass, and the stopper becomes cemented into the neck; but if the stopper is dipped in paraffine before being inserted it is preserved from the action of the acid.

The power of paraffine to resist the action of acids is very remarkable. Prof. Seely boiled a quantity of it in strong nitric acid, and it was not altered in the least. Neither was it altered when placed in a cold mixture of the two acids, but on heating the mixture it was decomposed and a large number of substances formed. The Professor did not separate these, but the presence of butyric acid in large quantity was indicated by its peculiar odor.

Paraffine, like many other substances derived from coal, is also produced by the destructive distillation of beech wood and other vegetable substances. The diverse properties of benzole and paraffine serve to give us some idea of the great part which the products of the destructive distillation of bituminous coal are destined to play in human affairs.

HISTORY OF TURBINE WATER WHEELS.

Number I.

Up to the year 1829 the only water wheels which had been used in the United States were the overshot breast, pitchback, undershot, Rumsey-re-action, Tyler-re-action and the flutter-wheel. Respecting their construction different millwrights entertained different opinions, each having some peculiar notions of his own which he carried out into practice, and thought it superior to any thing done by others. Works then published on hydraulics and millwrighting were of little or no value, as they only contained information of a general character respecting breast and undershot wheels merely. Excepting the overshot and breast wheels, none of the others gave out more than fifty per cent of the water power, and the art of millwrighting was in a very crude condition. Experiments, however, were then in progress, the issues of which have revolutionized the entire art, so far as it relates to the very general improvement and adoption of re-action wheels—this term being used for those through which the water passes, in contradistinction to those which receive the water and discharge it from the same openings of buckets. These experiments were begun in 1824 by Zebulon and Austin Parker, residing in Muskingum County, Ohio, who made an arrangement with Joseph F. Monroe to erect a dam, lock and mills on a tract of land situated on Hill-creek, about four miles above its junction with the Muskingum river. They put in a common flutter-wheel to drive their first saw after the mill was up, but found it to be a very unprofitable motor on account of its frequent stoppages from back-water. The creek was very sluggish and crooked, and the whole fall was but seven feet; consequently a very small rise of water in the creek caused the mill to stop. This wheel in such a situation, therefore, proved a failure, and the brothers Parker then began to inquire after one that would be more efficient in situations exposed to back-water pressure. The Rumsey-reaction was then extensively known in Ohio as a back-water wheel, and it had been used more or less from the earliest settlement of the territory. It had always been hung horizontally upon a vertical shaft, and was not well suited for driving an up-and-down saw, as it had to be geared in a peculiar manner to get up the proper motion. Messrs. Parker concluded that it was not suitable for their mill and after considerable reflection they devised a new motor consisting of six small re-action wheels set in pairs, hung vertically on a horizontal shaft with the crank attached to the saw pitman in the same manner as with the flutter-wheel. The whole were made, but Messrs. Parker being young and inexperienced, admitted the water to them in the wrong direction—contrary to instead of with, the wheel's motion. The consequence of this arrangement was, that instead of the wheel performing as had been expected by the inventors, they scarcely exercised any power whatever, and ran with the utmost difficulty. The inquiry arose, "What is the cause of the wheel's failure?" They were then unable to discover the error, and finally concluded to give up the saw mill, and they proceeded to erect a grist mill alongside of it intending to use a Rumsey-re-action wheel on a vertical shaft, which was well suited for grinding purposes. For this wheel they adopted improved buckets of thin cast-iron plates bolted between wooden rims, the bottom one being a wooden disk fastened to the shaft and the top rim was made narrower than had been customary in other wheels. This wheel was made to run directly under the forebay, and near the lower end of the forebay the water passed into the wheel through a round opening in the bottom. This orifice corresponded in size with the inner circle of the top rim of the wheel. When finished, this wheel was tried and its makers were satisfied that it was as effective as others of the same class. It happened that the headgates were rather imperfect and leaked sufficient water when shut to make the wheel run constantly, though slowly. In proceeding to erect the gearing and rig the stones for grinding corn, a plank happened to fall into the forebay above the wheel, and the water carried it forward until it lodged against a post in the center of the forebay, when it tilted up on its edge with one end extending down near the wheel, and the other against the side of the forebay. This accidental position of the plank led to the invention which revolutionized the application of turbine wheels. The plank gave a direction to the water in the forebay, which made it assume a vertical motion and enter the wheel case in the same direction of the wheel's rotation. The attention of Zebulon Parker was directed to this by the wheel suddenly doubling its speed. He was surprised; went to see if the gate was not raised, and there found the angled plank, and saw the whirling motion given to the inlet water by the wheel. After a few moments' reflection on the circumstance, he raised the plank and allowed the water to flow as before, when the wheel at once ceased its more rapid motion. The plank was again inserted and the water made to circle with the wheel's motion, when the wheel started as before with a double velocity. The plank was again raised, and placed in a contrary position so as to give the water the direction which it had in the abandoned Rumsey wheel in the saw mill. The result was, the wheel stood stock still and remained thus while the plank was thus held. The plank being removed, the wheel started, and ran as before.

The two brothers then consulted together, and decided to arrange the guide for their wheels, so as to direct the water downward with a vertical motion coinciding with the rotary direction of the wheel. The guides were thus constructed with a box around them and the water was admitted to the wheel which was then started to grind corn. It operated in a very superior manner, doing more work than any wheel of the kind ever had been known to do before. This was the first great step made in the improvement of re-action wheels in America.

Spectrum Analysis in Lecture Rooms.

We take the following from the Paris correspondence of the *Photographic News*:—

The remarkable experiments of Kirchoff and Bunsen upon the spectra of flames colored by metals have been fully described in your pages. M. Debray has conceived the happy idea of projecting these spectra upon a screen by means of a Drummond light. The combustion of coal gas sustained by atmospheric air gives too pale a flame when metallic substances are introduced into it to enable us to see the spectra clearly except with the aid of a telescope; but if we take the exceedingly hot jet of an oxyhydrogen blowpipe, colored by various metals, the splendor it acquires is so brilliant that it becomes very easy to project the spectrum upon a screen, so as to be seen distinctly by an audience. To this end, the flame is introduced into Dubsocq's photographic apparatus, now so generally employed in optical experiments, and proceed precisely as in obtaining the spectrum from an oil lamp or from the voltaic arc. We then obtain upon a screen suitably adjusted the series of brilliant and vari-colored rays which characterize the metal introduced into the flame. These experiments are successful not only with the alkaline and earthy alkaline metals, but also with other metals, such as copper and lead, although these bodies give with a gas flame, and the ordinary apparatus only a very confused phenomenon. As platinum melts instantaneously in the flame of the blow-pipe, the metallic substance is introduced by means of the small piece of retort coke, or by a match strongly impregnated with the matter to be experimented upon, which will be preferably selected from the metallic chlorides; with a little practice we can sustain the phenomenon long enough to study all its details at a very great distance.

By employing the Drummond light, we can also project the development of the brilliant ray of sodium, as first observed by M. Foucault, by the aid of the electric light. The Drummond light, placed in the photogenic apparatus, gives a continuous spectrum, in which a black ray appears in the place occupied by the brilliant ray of sodium in the spectra of the flames containing this metal, upon placing in front of slide of the apparatus the flame of a lamp fed with alcohol containing chloride of sodium.

MR. COBDEN has promised to bring the decimal coinage question before Parliament during the ensuing session.

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Correspondence

Gravity and the Pendulum.

MESSRS. EDITORS :—The Concord writer in the SCIENTIFIC AMERICAN of the 22d inst. denies the orthodox doctrine that the force of gravity is less at the equator than at the poles ; or that the slower vibrations of the pendulum is caused thereby, but states that this result is owing to the greater distance from the center of the earth, giving a more acute angle for gravity to act on the pendulum. And that "a pound is a pound all the world round." Reply—The surface of the ocean is higher at the equator than at the poles, because the effect of the centrifugal force makes it lighter and the pound or its equivalent, the pint, partakes of the levity. An inverted siphon would afford an analogous case, where a column of heavy fluid in one leg should balance a longer column of lighter fluid in the other leg. The effective center of gravity for the pendulum is in no case at the center of the earth, as the writer supposes, but far short of that point.

T. W. B.

Cincinnati, Feb., 1862.

[We have received other letters since the above was in type, taking the same ground. We have been more pleased with the answers called out by the communication of our New Hampshire correspondent, than with any other series of letters that we ever received. They all exhibit an understanding of the subject, and are marked by the philosophic spirit which is the proper accompaniment of conscious knowledge. The only exception either to the intelligence or the fairness which we have noticed is in the columns of our esteemed cotemporary, *The American Railway Times*, which at the end of a captious article publishes this bit of nonsense. "What becomes of the center, or the amount of gravity, when the sphere is flattened ? Is the total attraction of gravity annihilated by reducing the sphere to a disk ? We believe on the contrary, that the gravity at the poles of the disk would be just the same as that at the center of the sphere, viz., the very maximum : and our reason for believing that is, because the center of the sphere and the poles of the disk are the same point."—EDS.

The Rifle Question.

MESSRS. EDITORS :—In your paper of the 8th inst. there are extracts from the English *Army and Navy Gazette*, on the subjects of rifle firearms and of the condemnation of the Enfield rifle. These extracts contain the following matter :—

"The late Lord Herbert, when Secretary for War, claimed a 'ten years' life' for the Enfield rifle ; experience proves, however, that its longevity is even less than this, and practicians know full well that long ere that prescribed decade has run its course the weapon, owing to an inherent susceptibility to the abrasion of the bullet and the frictional action of the ramrod, especially toward the muzzle, where the grooves are shallowest and barrel weakest, ceases to be a rifle in all save name. Thus it is notorious that even at the Hythe school of musketry the Enfield rifles of 1853, and even of a more recent date, have had to be put aside as worn out and effete."

Now, in regard to this, insomuch as the preservation of rifled cylinders is concerned, I would recommend that a small piece of zinc be fixed in contact with them. By this means a galvanic current will be generated and corrosion in a great measure arrested. It is clear that friction must have a more prejudicial effect upon a rifled cylinder when the metal is in a corroded state than when it is comparatively free from rust.

I suggested to the British government that all rifled artillery and all rifled muskets in their service should be furnished with a galvanic arrangement for the purpose of preventing corrosion in the cylinders, and thereby preserving the grooves in a serviceable state long after the usual period, but, judging by the reply which I received, my suggestion was either not understood or not appreciated.

And it is not only artillery and rifles that may be preserved in this way. The principle may be applied to all iron or steel instruments or tools that are used in the arts of peace. I believe the application of it has already been made to certain steel instruments.

With reference to Mr. Charles Potts's views on the subject of combining rocket power with that which a projectile derives from its discharge in the usual way, I would state that I submitted the matter to the British government two years ago ; it was sent to the Select Committee of Artillery Officers at Woolwich for consideration, and the report was unfavorable. I am still of opinion that when extreme ranges are required the invention would be of much moment, and I hope Mr. Potts will have it tested on a large scale, which I had not an opportunity of doing.

R. MYRTLETON.

London, Canada West, Feb. 28, 1862.

Anchor Ice.

MESSRS. EDITORS :—Can you give me any information about what is called "Anchor Frost," particularly its formation ? It is a subject upon which we converse once in a while, but we do not seem to get very near the truth of it as yet—why it forms at the bottom of the stream where it is most rapid, about mill wheels, &c. If you can give me any information on the above subject you would oblige me very much.

E. F., JR.

Westerly, R. I., Feb. 26, 1862.

[Water is most dense at a temperature of 39⅕° above zero of Fahrenheit's scale ; consequently, when the water at the surface of a still lake or pond has been reduced to this temperature it sinks and the lighter water rises to the surface. This vertical circulation goes on till the whole mass is cooled to 39.2°, and then, as that at the surface grows lighter by becoming colder, it remains at the surface until it is frozen. If water continued to become more dense down to the freezing point, no ice would form until the whole mass was cooled to this degree, and the whole lake would be frozen. Its property of expanding below 39.2° is a most fortunate provision of nature to keep up the flow of rivers and prevent the accumulation of vast masses of ice, which would give us chilly springs, and might carry winter weather far into the summer. When water is violently agitated by being tumbled along in a rapid stream, or by being beaten by wheels, it is all exposed to the air and may thus all be reduced to the freezing temperature. In this case it freezes at the bottom as well as at the surface, and produces anchor ice.—EDS.

A Considerable Shower.

A correspondent writing from San José, California, says :—About six weeks ago we had a slight shower that lasted about three weeks, when it set into rain and has kept it up ever since. A rain gage, carefully kept and registered by Dr. Snell, of Sonora, Tuolumne County, shows that from the 11th day of November, 1861, to the 14th day of January, 1862, seventy-two inches of water fell at that place. This is sufficient explanation to all the world of the cause of our unprecedented deluge. It is also asserted by several persons on the Klamath river that the water at the mouth of Salmon, on the Klamath, was forty-two feet above the wire bridge, and the wire bridge being ninety feet high, makes it one hundred and thirty-two feet perpendicular. The river is narrow at this point, and the measurement was taken on trees above the bridge.

POWDER MANUFACTORY.—A powder manufactory is to be started in California by a company which has just been incorporated with a capital stock of $100,000. The war has raised the price of powder so that it can be profitably made in California, where there is a large and steady demand for it for blasting purposes. The charcoal employed is made from willow, which grows on all the valley and mountain streams there. Sulphur is very plentiful in many parts of the State, particularly in San Luis Obispo, Santa Barbara and Los Angeles counties, where vast beds of it exist, and it has already found its way into market. Saltpeter is also abundant at the head waters of the Pajaro river, in Santa Cruz county.

IN Austria the Danube had inundated a district of country in which no less than 80,000 persons were rendered houseless. Rain fell for four days, almost without interruption. Bridges and viaducts were destroyed, and the railroad service was nearly all suspended. Several towns were also inundated by the Danube, including Presburg and Pesth.

Iron-Clad War Steamers.

The Navy Department has issued proposals for the construction and equipment of iron-clad vessels for river and harbor defense. The following are the particulars :—

With the exception of those for the Mississippi river and its tributaries the proposed new vessels will be propelled by screws, those for the Mississippi river and tributaries may be propelled by paddle--wheels. The hulls will be either wholly of iron (which would be preferred) or of iron and wood combined, as the projectors may consider most suitable for the object proposed, but their sides and decks must be protected with an iron armature sufficient to resist the heaviest shot and shells

The vessels for the Mississippi river and tributaries are not to draw more than six feet water when fully equipped and armed, at which draft they are to be able to maintain a permanent speed of nine knots per hour in still water, and carry sufficient coal in the bunkers for six days' steaming at that speed. Their armament will consist of not less than six eleven-inch guns.

The vessels for harbor defense are not to draw more than twelve feet water when fully equipped and armed, at which draft they are to be able to maintain a permanent speed of ten knots per hour in smooth water and carry sufficient coal in the bunkers for seven days' steaming at that speeed. Their armament will consist of not less than from two to four eleven-inch guns.

The vessels for coast defense are not to draw more than twenty feet water when fully equipped and armed, at which draft they are to be able to maintain a permanent speed of fifteen knots per hour at sea, and carry sufficient coal in the bunkers for twelve days' steaming at that speed. Their armament will consist of one or two fifteen or twenty-inch guns.

The guns of the vessels for harbor and coast defence are to train to all points of the compass, without change in the vessel's position.

The propositions must state the number of vessels subject to the election of the Department, which the party proposes to furnish complete in every respect, embracing armor plating, steam machinery, and equipments of all kinds, ready for service, excepting only the ordnance and ordnance stores and provisions The proposition must be accompanied by descriptions, specifications, drawings and models of such character that the work could be executed from them.

The place of delivery must be stated, the time within which the vessel or vessels are to be completed, and also the total sum to be paid for each.

It will be stipulated in the contract that one-fifth the total amount will be retained by the government until sixty days after the reception of the vessel, in order to give it a trial, the remaining payments being made with due regard to the proper performance and progress of the work ; the contract will also embrace forfeitures for failure to perform the conditions specified.

The bids must be accompanied by the guarantee required by law, that, if a contract is awarded, it will be promptly executed ; and the names of the parties who are to become the sureties to the amount of the face of the contract will also be stated.

The department will consider any other proposition that may be presented, in which the draft of water above named is not exceeded.

The department will be at liberty to accept or reject any or all the propositions.

All proposals must be sent to the Navy Department at Washington, not later than the 26th of March.

PROFESSOR ROGERS estimates that one-sixth part of the total produce of the coal mines of Great Britain is employed in generating force, which force is equivalent to that of 55,000,000 of men. Half an acre of coal, three feet deep, will yield 10,000 tuns, and this quantity is equivalent to the labor of 3,000 men all their lives. If we take the annual produce of the mines in Great Britain at 65,000,000 tuns, we have an equivalent to the force of 400,000,000 adult men.

SINCE General Burnside's army took possession of Roanoke Island, the supply of turpentine has increased. It is now selling at 95 cents per gallon in New York and is dull at this reduced rate.

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Powerful Artillery---Iron Forts and Improvements in Iron and Steel.

The following interesting extracts are from the address of the new president, Mr. Hawkshaw, of the Institution of Civil Engineers, London :—

In a very few years, mainly in consequence of the labors of Sir William Armstrong and of Mr. Whitworth, the range of artillery has been doubled. The weight of the gun, in proportion to that of the projectile, has been reduced to one-half, and the capacity for powder of the elongated, as compared with the round shell, has been more than doubled. This great advance in the destructive power of cannon has rendered most of our old fortifications useless. New fortifications have therefore to be built, adapted to the longer range and greater destructive power of the new artillery. These fortifications require to be placed more in advance of the places to be defended, and to be constructed with very superior powers of resistance to those which hitherto have proved sufficient. The old walled towns, which were formidable enough in former days, would to-day, in case of a siege, afford little security to the inhabitants who dwell within them ; the old defences, therefore, have to be removed, and replaced, where necessary, with those more suitable to modern requirements.

There are some cases in which forts may with advantage be principally, if not wholly, built of iron. I hope to see that material adopted for the superstructure of the large sea forts at Spithead, the construction of the foundations for which has been intrusted to me. There can, I think, be no insuperable difficulty in constructing iron forts so as to be impregnable to a ship's battery, though, in the absence of knowledge as to what may be the ultimate powers of guns, it is not easy at present to arrive at safe conclusions. The difficulty of doing the converse of this, viz., of building ships so as to be impregnable to the fire of such artillery as may and ought to be placed in the new forts, will be a problem not so easily solved.

Should it turn out that steel, or homogeneous iron, as it is sometimes termed, uniform in quality, and of double the strength of ordinary iron, can be manufactured in large quantities at a moderate price, and can be easily manipulated, then many things that are now with difficulty accomplished will be greatly facilitated, and some things which cannot be done at all, will be rendered practicable.

Bridges of greater span could be constructed. Screw shafts, crank-axles, and other parts of steam engines, at present of unwieldy size, would by its use be reduced to more moderate dimensions. There seems to be no limit to the size of guns, except that of the strength of the material, and the power of welding, forging and handling them.

We are, I believe, in the infancy only of discoveries in the improvement of the manufacture of steel and iron. Until lately, the nature of the demand for iron rather retarded than encouraged improvements in its manufacture. Railways consumed iron in vast quantities, and railway companies cared nothing about quality. They were driven to seek a tolerably good material for engine and carriage tires, but, as it respected the vast consumption in the shape of rails, they were implicitly guided by the lowest prices. As long as this system continued, it suited the ironmasters to manufacture a cheap article in large quantities, and they therefore gave themselves no concern to establish a better state of things. But heavy engines, high speed, and an enlarged traffic are gradually working a change. We are beginning to find that iron of the very best quality has hardly endurance enough for rails or locomotive tyres ; that there is no economy in putting down rails which require taking up again in a year or two ; and, in short, that the increased strains arising from the accelerated motion of railways, steamboats and machinery generally are necessitating a better material.

[The Scientific American has proposed and discussed this matter repeatedly, and Gen. Totten conducted an expensive series of experiments several years ago to test the thickness of plates required.—Eds.

Losses on the American Lakes.—The marine losses on the St. Lawrence and lakes during the year 1861, amounted in value to $302,625 on steamers, and $564,722 on sailing vessels and their cargoes. The number of lives lost was 116 ; that of last year 578.

Spring Car Wheels.

The *Leeds Intelligencer* has been writing a series of articles under this heading, and in one lately published says :—In the first of these articles we drew attention to the peculiarity of the railway wheel as differing from all others, and to the unsatisfactory working of a rigid wheel upon an uneven rail. The wear and tear which results to rail, wheel and axle is something enormous, and the discomfort of the motion most people can declare for themselves. It is, therefore, strange that when a remedy is offered for such a serious evil it should be obstinately rejected. We allude to a wheel invented by a sound engineer (and most vigorous writer), Mr. Bridges Adams, having springs, or rather a circular spring, between the tire and the body of the wheel, which breaks the force of the blows whether vertical or lateral. In other words the tire has a sufficient amount of "play" for it to yield to the inequalities of both the surface of the rail, and the side of the rail. The results are that the face of the tire and the face of the rail, which by mutual concussion now so rapidly wear out, are both saved ; the flange of the wheel is no longer stripped off by the lateral projections of the rail ; and as the wheels no longer jump, but roll, the train runs easily along with comparatively little vibration. It is a fact that by this invention an inferior and low-priced iron works perfectly well, and lasts beyond comparison longer than the hardest and most expensive metal on the old method. Its practical value is freely admitted, yet because juries exact such enormous compensation for injuries, if there be any departure from the established system, the companies really dare not introduce it. This, at any rate, is their excuse—how far prejudice and vested interests are concerned, we had better not inquire too closely. As regards safety no objection has been offered. Even if the tire should break, it could not fly off—a common cause of accident—but of this there is little danger even in frost, as the tire is put on cold, with the fibers of the metal in a state of rest, and uninjured, whereas the ordinary tire is strained on hot, with the fibers in a state of tension, and therefore of weakness. It has been in actual service, not for a few months merely, but for six years, on several lines, and applied to engines as well as carriages, and has stood the severest tests that could be applied to it. In fact the principle is scientifically correct, and therefore must answer. We may add that the original cost is less than the regulation wheel, while the wearing power is from 100 to 400 per cent greater, to say nothing of the saving to the rail, which is in similar proportion. Its economy is a consideration for shareholders, its comfort is a consideration for the public, and on any theory of forces the two combined should be powerful enough to overcome the *vis inertiæ* of directors and engineers.

Gut Strings for Musical Instruments.

Those tensiled strings, called catgut, which are largely employed for musical instruments and other purposes, are mostly made from the intestines of sheep, not the feline tribe, as is most generally supposed. The *Technologist*, of London, gives the following description of the manufacture of these strings. It says :—

The manufacture of musical strings requires a great amount of care and skill, both in the choice of materials and in the manufacturing processes, in order to obtain strings combining the two qualities of resistance to a given tension and sonority. Until the beginning of the last century, Italy had the entire monopoly of this trade, and they were imported under the names of harplings, catlings, lutestrings, &c.; but the trade is now carried out, with more or less success in every part of Europe. However, in the opinion of musicians, Naples still maintains the reputation of making the best violin strings, because the Italian sheep, from their leanness, afford the most suitable material; it being a well-ascertained fact that the membranes of lean animals are much tougher than those of high condition. The smallest violin strings are formed by the union of three guts of a lamb (not over one year old), spun together.

The chief difficulty in this manufacture is in finding guts having the qualities before mentioned, namely, to resist tension, and giving also good vibrating sounds. It is far more easy to arrive at the proper point in the making of harp, double bass, and other musical strings, and the manufacturer is not so much circumscribed in the choice of the proper material. The tension upon the smallest string of the violin, which is made of only three guts, is nearly double that on the second string, formed by the reunion of six guts of the same size.

In the preparation, the sheep's guts, well washed and scoured, are steeped in a weak solution of carbonate of potash, and then scraped by means of a reed cut in the shape of a knife. This operation is repeated twice a day, and during three or four days, the guts being every time put into a fresh solution of carbonate of potash, prepared to the proper strength. In order to have good musical strings it is indispensable to avoid putrid fermentation ; and as soon as the guts rise to the surface of the water, and bubbles of gas begin to be evolved from them, they are immediately spun.

In spinning, the guts are chosen according to their size, combined with three or more, according to the volume of the string required, they are fastened upon a frame, and then alternately put in connection with the spinning-wheel, and submitted to the required torsion. This operation performed, the strings left upon the frame, are exposed for some hours to the vapor of sulphur, rubbed with a horse-hair glove, submitted to a new torsion, sulphured again, further rubbed, and dried.

The dried strings, rolled upon a cylinder and tied, are rubbed with fine olive oil, to which one per cent of laurel oil has been previously added. The oil of laurel is supposed to keep the olive from becoming rancid.

The gut strings employed by turners, grinders, &c., are made with the intestines of oxen, horses and other animals. These, cleared by putrefaction of the mucous and peritoneal membranes, and treated by a solution of carbonate of potash, are cut into strips by means of a peculiar knife, and spun in the same way as the musical strings. Lately, however, the vegetable parchment, as it is termed (which is ordinary paper steeped in sulphuric acid), has come into extensive use for this purpose.

The use of the raindeer-sinew for lashing and binding purposes on implements, &c., is common from Norway and Lapland, along the entire coast of Asia and America, even as low as 36° N. in Calfornia, and continued on the coast line up to the eastermost point of America, and again at Greenland. Sir E. Belcher, in "Transactions of the Ethnological Society of London," states he traced this custom of using the reindeer sinews continuously on the western coast as far south as the thirty-sixth parallel on the coast of California, where the Mexican Indians soak it and form it into layers, in which they inclose the wood of the bow entirely.

Tempering Bronze.

Bronze is a term usually applied to alloys of copper and tin, in contradistinction to brass, which is a compound of copper and zinc. Bronze has been longer known than iron. It was employed by the remote ancients for arms, swords, shields and almost every kind ot cutting instrument ; and also for works of art. A bronze compound of 93 parts copper, by weight, and 7 of tin, is harder than copper, and yet it is more fusible. This alloy can be tempered and rendered very hard by the very opposite process of hardening steel. The bronze is first highly heated, then cooled very slowly, when it becomes hard and brittle. The same treatment would render steel soft. In order to soften or anneal bronze it is heated to redness, then plunged into cold water, when it becomes so soft that it can be stamped in a die press.

Bell metal, gun metal and statue metal are simply bronze—alloys of copper and tin. These two metals combine in almost every proportion. Bell metal contains 78 parts copper and 22 tin, and some makers add 1 per cent of antimony. Gun metal is composed of 8 parts copper and 1 of tin.

Speculum metal is a very hard bronze, which receives a very brilliant polish, and is employed for reflectors in telescopes. It is composed of 6 parts copper, 3 of tin and 1 of arsenic.

A flax manufactory, as we learn from the *Prairie Farmer*, is about to be erected at Chicago. Quite as good flax can be raised in Illinois and most of the other Western States, as in Ireland.

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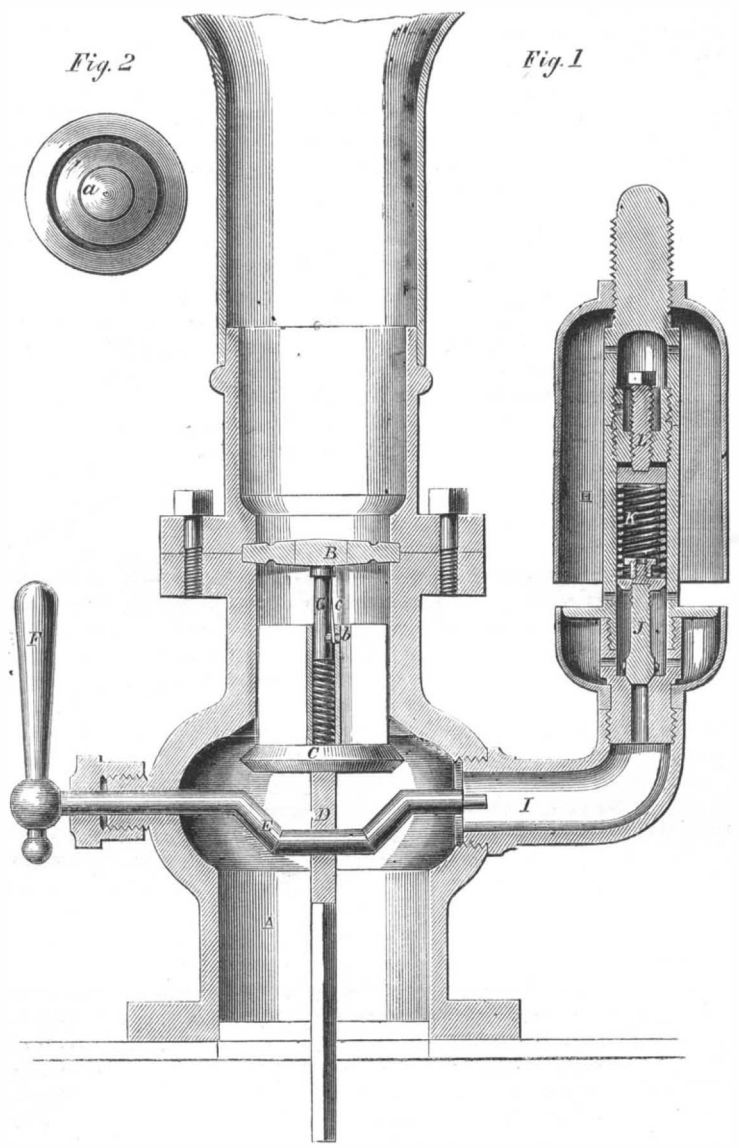
Improved Safety Guard for Steam Boilers.

It is not strange that steam boilers explode. It is probable that few practical or theoretical engineers fully appreciate the strain which is exerted by the steam in boilers tending to tear them asunder. If we could see twenty loads of hay suspended from each end of a boiler, we could form some idea of the strength of metal necessary to resist the strain. But the steam is so completely hidden inside, and it is so silent and quiet, that we do not realize its herculean efforts to tear asunder the iron bands which compress it, and it is only when some portion of the metal gives way, and the ponderous boiler is hurled through the walls or roof of the building, away into the air, that we form any conception of the expansive power of steam. If we fully appreciated this power we should be surprised, not that boiler explosions occasionally take place, but that they do not occur far more frequently. That boiler explosions occur as seldom as they do is to be attributed, first to the great strength of iron, and secondly, to the care taken to prevent them. One of the devices adopted for this purpose is to make some portion of the boiler far weaker than the rest, and to so arrange the parts that when this weak portion gives way no considerable harm will result. The accompanying engravings illustrate a modification of this plan invented by George Mann, Jr., of Ottawa, Ill.

A cylinder, A, is bolted to the boiler, with which it communicates by a hole made for the purpose. This cylinder is closed by a metallic disk, B, which is made so much weaker than the boiler plate that it will be broken and blown out by a pressure of steam insufficient to burst the boiler.

The valve, C, is provided to close the passage through the cylinder, A, after the disk, B, is blown out and thus prevent the steam from blowing off while a new disk is being put in. The stem, D, of the valve, C, has a slot through which passes the bent shaft, E, having the lever, F, upon its end. It will be seen that when the lever, F, is turned up in the position shown, the valve, C, is open; and as the lever, F, is in sight, the valve, C, cannot be closed and the steam thus shut off from its action on the disk, B, without this dangerous arrangement of the parts being made manifest to any inspector of the boiler.



MANN'S IMPROVED SAFETY GUARD FOR STEAM BOILERS.

For further security, a fusible plug is introduced into the disk, B, formed of such alloy that it will melt at a temperature corresponding as nearly as may be with the pressure required to break the disk. A plan view of the disk with its plug, *a*, in the center is shown in Fig. 2.

To prevent the engineer from closing the valve, C, after the disk, B, has been introduced, a pin, G, is fitted into the upper part of the valve stem; this pin being of such length that while its upper end bears against the lower side of the disk B, its lower end will press against the valve and hold it open. But as soon as the disk, B, is broken, or as soon as the fusible plug in its centre is melted, the pin, G, will rise in the opening and allow the valve, C, to close. The proper length of the pin, G, is obtained by drilling a hole through it horizontally, and inserting loosely, a small pin, *b*, which is pressed outward by a spring, *c*, so that when the valve is open, the pin, *b*, will rest upon a shoulder in the valve stem, and prevent the pin, G, from being pressed farther into it. A spiral spring, *d*, presses the pin, G, up so as to bring the small pin, *b*, above the shoulder in the valve stem. When the disk, B, is to be replaced, the small pin, *b*, is pressed in to allow the pin, G, to sink down into the hollow valve stem out of the way.

Connected with this apparatus is a whistle to sound the alarm before the pressure becomes sufficiently high to break the disk, B.

An ordinary steam whistle, H, communicates with the boiler through the pipe, 1, and cylinder A. The passage to the whistle is closed by the valve, J, which is pressed against its seat by the spiral spring, K. The tension of the spring, K, is adjusted to the pressure at which it is desired to sound the alarm by compressing it by means of the screw, L. As the head of the screw, L, is within the cylinder which surrounds it, it can be turned only by means of a key adapted to it, and this key may be kept within the control of the owner, or foreman of the works, where the boiler is in use, and thus it will be out of the power of the engineer to adjust the whistle to a higher pressure than that determined upon by the owner.

This safety guard is designed especially for locomotive engines. It is easily attached, and prevents the engineer from carrying more steam than is needed to do the work, and thus not only diminishes the danger of explosions but also effects a saving of fuel.

The patent for this invention was granted through the Scientific American Patent Agency, June 18, 1861, and further information in relation to it may be obtained by addressing Thorn & Mann, Ottawa, Ill., or Henry Hise, General Agent, 441 Market street, Philadelphia.

Naphthaline Colors.

The following is the substance of recent remarks by the celebrated French chemist J. Persoz before the Academy of Sciences, Paris. He said:—

Starting from the fact established by us, that a mixture of commercial nitric and sulphuric acids, even in very variable proportions, will, when heated with naphthaline, readily yield colored products, we have naturally been led to examine the action of concentrated sulphuric acid on the various nitrogenized compounds of naphthaline.

This is a very difficult study, however simple it may at first appear, because the least changes of the condition under which the experiment is performed, exercise a sensible influence on the results. The dye principle formed, possesses the property of madder in dyeing with mordants; its color varies from red to blue, and passes through all the shades of violet.

The blue was only obtained accidentally; and we are unable to state the precise conditions of its formation, though it appears to be due to molecular change in the nitrogenized naphthaline compound, under the influence of a physical agent.

As the violet-blue tints are the most beautiful, we have devoted most of our attention to them, and have endeavoured to produce them. We soon found that binitronaphthaline, heated with sulphuric acid only, was best suited to our purpose. In his last communication to the Institute M. Roussin says:—"By making concentrated sulphuric acid react on binitronaphthaline, no reaction takes place. The binitronaphthaline is completely dissolved when the mixture is heated to 250°, and the liquid takes hardly an amber color. After boiling for a long time, the concentrated sulphuric acid began to react on this substance." Binitronaphthaline resists the action of sulphuic acid at a very high temperature, however, at about 300°; the color of the solution, at first slightly yellow, deepens more and more, becomes cherry-red, and finally brownish-red, beginning, at the same time, to disengage a small quantity of sulphurous acid.

The substance is then taken from the fire, and left to cool when it is poured into a proper quantity of water and boiled. The liquid, filtered whilst hot, is of a deep red color, and deposits part of the coloring matter in a flaky state. Alkalies change it to violet red; and even when cold, silk was easily dyed violet by it. After being properly saturated with alkalies, and finally with a little chalk, it dyed mordanted cotton tissues with different shades, varying from lilac to black. The lake alum, tin, and lead for a base, are violet; those with iron for a base, were olive, and sometimes reached to black.

This solution does not seem to alter even during any length of time, in presence of sulphuric acid; though, when in contact with air and excess of ammonia, it changes to brown in a few hours, depositing a black powder, which becomes blue dissolved in alcohol, and red in acids.

The black mass proceeding from the precipitation of the sulphuric solution by water, contains a large quantity of coloring matter, has a beautiful gold reflection, is very soluble in alcohol and pyroligneous acid; but very little soluble in water, ether, benzole, and bisulphide of carbon. It has many chemical analogies with alizarine. The dyed tissues bear brightening with soap.

With binitronaphthaline and concentrated sulphuric acid only, without making use of a reducing agent, a coloring matter may be obtained with marked analogies to alizarine in its chemical properties.

GASES GIVEN OFF BY PLANTS UNDER THE INFLUENCE OF LIGHT.—M. Boussingault has discovered, says the *Comptes Rendus*, that under the influence of direct sunlight, the leaves of aquatic plants give off a notable proportion of carbonic oxide and carbureted hydrogen. He thinks that this emanation of carbonic oxide may be one of the causes of the unhealthiness of marshy districts. The fact he points out is important, and the subject will, no doubt, receive further investigation.

THE price of crude petroleum at "Oil City," Pa., is but six cents per gallon.

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Scientific American

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

☞ See Prospectus on last page. No traveling agents employed.

VOL. VI. NO. 11.....[NEW SERIES.].....*Eighteenth Year.*

NEW YORK, SATURDAY, MARCH 15, 1862.

WHAT CAN BE DONE FOR INVENTORS.—ADVICE GRATIS AND ADVICE FOR PAY.

For the information of our new subscribers, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and contemplate securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a model or drawing and a description of the invention should accompany the remittance.

The publishers of this paper have been engaged in procuring patents for the past sixteen years, during which time they have acted as Attorneys for more than FIFTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,

No. 37 Park-row, New York.

WAR AND TAXATION.

War may justly be regarded as the greatest of all curses; but its influence on a nation is not necessarily debasing. Few events rouse and elevate the nation so much as a just and patriotic war. It raises the tone of public morality and destroys the sordid selfishness and degrading submissiveness which so often result from long-protracted peace. Such was the Dutch war of independence against the Spaniards; such the German war against the aggression of Louis XIV., and the French war against the coalition of 1792. Such were the wars of the Revolution and of 1812. Dr. Lieber very justly inquires, "Whence do Americans habitually take their best and purest examples of all that is connected with patriotism, public spirit, devotedness to common good, purity of motive and action, if not from the daring hand of their patriots of the Revolution?" The government of the United States—the most kind and paternal on earth—a government that never injured unjustly a single citizen entitled to its protection, was ruthlessly and wickedly assailed by a band of ambitious conspirators who sought its overthrow; and millions of loyal citizens declared, in the stirring words of the patriot Jackson, "the Union, it shall and must be preserved." These burning words were earnestly uttered by their author, and in seizing them as the rallying cry for the great emergency now upon the country, their meaning is intensified a thousand fold. This is attested by the fact that more than 600,000 loyal hearts are now in arms to defend that stirring utterance to the death, and the best blood of the land has poured forth freely in devotion to it. These noble men cannot be armed, fed and clothed without money, and the government must sink to ruin unless the people patriotically submit to taxation to uphold it. Our people are unused to taxation, but they must submit to it cheerfully unless they are willing to see their heritage ruined forever.

We present herewith the following abstract of the tax bill which is now before Congress, as reported by the Home Committee of Ways and Means. Let us all make up our minds to meet its demands without grumbling, and labor and pray the more earnestly that the cause of the present trouble may speedily come to an end.

The bill provides for the appointment by the President of a Commissioner of Internal Revenue, with a salary of $5,000 per annum, his office to be in the Treasury Department, with a suitable number of clerks.

The country is to be divided as the President may direct, into convenient collection districts, with an assessor and collector appointed by the President for each district, who shall have power to appoint such deputies as may be necessary.

The bill provides for a duty on spirituous liquors of 15 cents per gallon; ale and beer $1 per barrel; stem or leaf tobacco 3 cents per pound—to add, when manufactured, 5 cents, and on cigars 5, 10 and 20 cents per pound according to value; on lard and linseed oil, burning fluid and coal oil 5 cents per gallon: refined coal oil 10 cents per gallon; gas, per 1,000 feet, 25 cents; bank-note paper, 5 cents per pound; printing paper 3 mills per pound; soap 5 mills per pound; salt 4 cents per 100 pounds; sole-leather 1 cent per pound; upper leather one-half cent per pound; flour 10 cents per barrel; all other manufactures 3 per centum *ad valorem*; on railroad passengers 2 mills per mile of travel; commutation tickets 3 per cent.; steamboat travel 1 mill per mile; omnibuses, ferry-boats and horse railroads 3 per cent on gross receipts from passengers; advertisements 5 per cent on amount of receipts annually; for the use of carriages annually from $1 to $10, according to value; gold watches $1; silver watches 50 cents; gold plate 50 cents per ounce; silver plate 3 cents per ounce; billiard tables $20; on slaughtered cattle 50 cents each; hogs 10 cents each; sheep 5 cents each. Licenses—For bankers $100; auctioneers $20; wholesale dealers $50; retail dealers in liquors $20; retail dealers in goods $10; pawnbrokers $50; rectifiers $100; brewers $50; hotels, inns and taverns graduated according to rental from $5 to $200; eating houses £10; commercial brokers $50; other brokers $20; theaters $100; circuses $50; bowling alleys $5 each alley; wholesale peddlers $50; other peddlers from $5 to $20; coal-oil distillers $20. Income—3 per cent on all over $600, deducting the income derived from dividends, &c., which are taxed separately; interest on railroad bonds and dividends of banks and savings institutions 3 per cent.; payments of all salaries of officers in the civil, military or naval service of the United States, including Senators and Members of Congress, 3 per cent.; legacies and distributive shares of personal property of deceased persons from 1 to 5 per cent, according to the degrees of relationship; and stamp duties on all kinds of legal and commercial paper, all patent medicines, telegraphic messages, and all goods by express.

AN explosion of three barrels of petroleum took place in Wright's varnish factory, Philadelphia, on the 27th ult. It was being boiled in a varnish kettle as a substitute for turpentine.

INDIA-RUBBER ROLLERS FOR WRINGING MACHINES.

Considerable interest is manifested as to how far india-rubber rollers can be used for wringing machines without infringing existing patents. We find upon an examination at the Patent Office that there are sixteen patents on which flexible rollers are used, dating back to 1845—the first of which we have any knowledge was a patent granted to H. Hogan, of Brandonville, Va., July 5, 1845, for a washing and wringing machine. The inventors say, "the rollers of the wringer may be covered with linen or other material to give elasticity." The English patent of W. S. Underhill, dated May 25, 1857, covers broadly the use of rubber or other elastic material for rollers for wringing machines, as will be seen from the following copy of his claim:—

I claim the improvement in wringing machines, by making one or more of the rollers used in such machines of vulcanized india rubber or other elastic or resilient material, or covering such rollers with elastic or resilient material, as before fully set forth and specified.

A patent was granted to Elliot Dickerman, of Richmond, Vt., April 10, 1860, and re-issued Jan. 8, 1861, for a combination of elastic rollers with rigid rollers at their backs. The claim reads thus:—

I claim, in machines for drying clothes by compression between rollers, employing, as one or both of the rollers, for acting upon the clothes, a rubber coated or equivalent elastic and non-absorbant roller, A, so mounted in a suitable framing, B B, that the compression of the elastic material on that side which is acting upon the clothes is attended by a corresponding compression of the elastic material, against a roller, D or E, on its opposite side, as and for the purpose set forth.

After a careful examination at the Patent Office we do not find that any patent has ever been granted in this country which covers broadly the use of india rubber for this purpose.

THE GREAT LONDON EXHIBITION.

It is announced in recent foreign intelligence that the Great Exhibition building in London is completed, and has formally passed from the hands of the contractors into possession of the Royal Commissioners. Owing to the extraordinary state of the country, and the refusal of Congress to appropriate money to facilitate the objects of the Exhibition, the American Department will make comparatively a poor show. Nevertheless, there will be several articles in the Exhibition of which our countrymen will have occasion to feel a degree of just pride. Even under the most favorable circumstances, we could not expect to compete with European nations, owing to the fact that we are so far away. The interests of our exhibitors will be carefully guarded by Mr. Joseph E. Holmes, who is the acting agent of the American Commissioners appointed by the President. Mr. Holmes is a thorough-going practical man, and will do everything in his power to sustain the honor of our country and promote the interests of our exhibitors. He was Superintendent of the Machinery Department of the Crystal Palace Fair held in this city in 1853, and performed his duties with fidelity. Mr. Holmes will act as special correspondent of the SCIENTIFIC AMERICAN; and our readers may expect to gain from his observations much useful information, especially in the department of machinery,

COLORED CANDLES FOR ILLUMINATING PURPOSES.

Wax candles are made of different colors, but they all emit a white light. Why may not candles be manufactured by introducing certain chemicals into the material from which they are made so as to show a variety of colors, such as blue, red, green, &c.? By arranging such candles in tasteful groups, beautiful effects may be produced in illuminating buildings. The time, we predict, is not far distant when we shall have occasion to rejoice over the settlement of our national difficulties, and then will be the time for a general rejoicing and illumination throughout the country. If some ingenious chemist will devise a way of embracing a cheap chemical with any of the material used for illuminating candles so as to render the light emitted from them of any desired color, we predict for him a fortune for his discovery.

THE work of gun-making is crowded to such an extent at the Springfield, Mass., Armory, that all the daylight is used, and over $5,000 worth of gas was burned during the last quarter.

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AMERICAN STEAMER FOR CHINA—HER STEAM ENGINE.

Amid the distractions of intestine war and the paralysis of many branches of manufacturing industry, it is gratifying to know that our foreign commerce is extending in various parts of the world. This is especially the case in China, where a number of American mercantile firms have established stations for trading purposes, and they now employ several American river and coasting steamers. The Yankee is becoming the steam carrier for these celebrated regions, and when the vast population of China is taken into consideration—estimated to be 400,000,000 souls—this trade must one day become gigantic in its proportions.

On page No. 39, Vol. V. (new series) SCIENTIFIC AMERICAN, we gave a brief description of the steamer *Shantung*, which was built in this city for the China coast trade, in which it is now engaged, and on Saturday, 1st inst., another beautiful craft—the *Kiang-Tse*—departed for the waters of the Celestial Empire. She is about 1,000 tuns burden, of a beautiful model, and fitted with an overhead beam engine, like that of our river boats. This engine was an object of great interest to a select party of engineers, editors and others who were invited, during the outward trip down the bay, to witness the operations of two different valve motions, with which it had been fitted, and which were arranged to be changed from one to the other, to show the effects of each. The engine has a cylinder fifty inches in diameter, with a stroke of ten feet. It was built by H. Esler & Co., Atlantic Dock Works, Brooklyn, and is a substantial and excellent piece of mechanism. The two valve motions with which it has been fitted are the Winter cut-off and the Dickerson & Sickles improved cut-off. Winter's cut-off was applied first, and was said to be as perfect as it could be arranged. The Dickerson & Sickles cut-off is more complex, but it is claimed for it that a saving of about thirty per cent in fuel is effected by its use. The *Kiang-Tse* started with this valve motion in operation, and when under regular and full headway, the wheel made sixteen revolutions per minute, and the motion of the machinery was very smooth—no jarring action being experienced. After thus running for a little over half an hour Winter's valve motion was "hooked on," when a violent pounding motion in the cylinder was felt, and the revolutions were reduced from sixteen to fourteen per minute. In both cases the firing was the same. With the Dickerson & Sickle cut-off the steam is admitted very gently at first, then it opens full, and closes instantaneously. The steam was cut off at three feet, and expansion was carried out during the rest of the stroke. Several engineers who were present stated that the Winter cut-off was not so well adjusted as it might be, with regard to lead in the valve. Mr. Dickerson stated that although his improvement effected a considerable saving over the other, it was but very small compared with what might be saved in the steam engine, when it is considered how very little of the entire heat of the fuel is utilized in the very best engine ever constructed. Thus the power of heat in 1 lb. of coal, equal to raising about 12,000,000 lbs. one foot high, if all utilized in a steam engine, would be less than three ounces of coal for a horse power, whereas the engine of the *Kiang-Tse* required three and a half pounds of coal with the Winter cut-off, and with the other cut-off the reduction of this amount to two pounds nine ounces, per hour, was, after all, a mere drop in the bucket, as it only amounted to one-eightieth of the entire power which the coal was capable of producing. As a general statement it amounts to this, that the very best steam engines in use do not give more than one-twelfth of the power that is in the coal which they consume. In other words, an Atlantic steamer which burns one hundred tuns of coal per day would only consume eight and one-third tuns, were all the power of the heat in the burning fuel utilized in power. What a field for improvement is still open to the inventor and engineer for economizing the power of the fuel that is consumed in the furnaces of boilers!

CHARCOAL is the best known substance for absorbing foul gases and preventing fetid smells arising from sewers, sinks, &c.

THE Bessemer process of converting pig iron into steel has been introduced into France.

KJOEKKENMOEDDING.

Authentic (profane) history commences about six hundred years before the Christian era. In the beginning the record of events is preserved only in a very small portion of the earth—a little peninsula in the south of Europe, now called Greece. But a preservation of the knowledge of affairs rapidly extended over Europe, Asia and Africa, and finally to America; and for nearly four hundred years history embraces the record of all important events which have occurred in any part of the world.

Great efforts have been made to pierce the darkness which hangs over the early history of our race. The traditions of the Greeks and Romans have been subjected to repeated critical examination, in order to extricate, if possible, some grains of truth from the mass of fable of which these traditions are principally composed. But the more they are examined the less reliable are they found to be. As at the dawn of history the Greeks were found reckoning their dates by Olympiads, and the Romans from the foundation of their city, it would seem as if the date of the first Olympiad and of the foundation of Rome might be fixed with certainty, and the first Olympiad was accordingly placed at 776 before Christ, and the foundation of Rome at 754 B. C. But there is great difference of opinion among critics in regard to the correctness of even these dates, and Niebuhr and Grote, who are among the latest and most learned historians, have brushed away almost the last remnants of the early traditions of Greece and Rome.

A more reliable history has been deciphered by Champolion, Bunsen and others from the inscriptions and paintings which are found in the tombs and temples of Egypt, and a succession of reigns has been traced back 3,800 years before the Christian era. But this is scarcely more than a stony skeleton of history, curiously containing, however, some minute pictures of the arts, manners, customs and social life of the ancient people who inhabited the valley of the Nile, and who probably led for many centuries the slow march of human civilization.

The last Smithsonian report contains an article by A. Morlot, of Lausanne, Switzerland, giving an account of certain discoveries recently made in Denmark and Switzerland, which afford us some positive knowledge of the inhabitants of those countries long previous to historic times. On the sea coast of Denmark are found broad heaps of shells which a close examination shows to have been collected by a very low class of savages. The writer of this has seen on the shores of the Pacific similar heaps of shells which were accumulated by successive generations of the degraded Digger Indians of California. They had eaten the shell fish and thrown the shells upon the ground. That the Danish shell heaps are artificial accumulations, and not natural deposits, is shown by several circumstances. Shells of adult individuals only are found, while natural deposits contain the young as well as the old of each species. There are also found in the same heap species which do not inhabit the same locality. Furthermore, the heaps are not stratified, and with the shells are found roughly fashioned instruments of silex, coarse pottery, charcoal, cinders and numerous bones of animals which have been manifestly split open artificially. These shell heaps are unquestionably the refuse of the meals of savages, and they are called by the learned Danes *Kjoekkenmoedding*, from *kjoekken*—kitchen, and *moedding*—refuse. Since 1847 these shell heaps have been subjected to a most rigid examination by some of the ablest geologists and archæologists of Denmark. Nearly 10,000 specimens of bones and other articles have been collected and labeled, and are now preserved in a properly classified arrangement. The most interesting facts developed by this examination are, that the heaps contain no metallic instrument of any kind, and no bones of any domestic animal except the dog, showing clearly a very low state of savage life. No charred remains of wheat or other grain have been discovered, indicating an absence of agriculture.

We are apt to wonder at the closeness of observation displayed by the Indian, and his shrewdness in drawing inferences from what he sees. But in both of these qualities—in minuteness and accuracy of observation, and in the power of drawing correct conclusions—the Indian is a mere child when compared with the masters of modern science. This is strikingly shown in the methods employed by Forchhammer and his colleagues in their investigations of the shell heaps of Denmark, and in the results of their investigation. We have already spoken of the proofs that these heaps were collected by human beings; that these beings were in the lowest state of savage life, that they were unacquainted with the use of any metal; that they had subdued to their service the dog and no other animal; and that finally they probably had not learned the art of cultivating the earth. Some of the other facts observed and the inferences from them are curious and interesting.

The species of shell found in largest number is that of the oyster, but the oyster has become extinct on those shores from the gradual freshening of the water, and this fact indicates a remote antiquity for the shellfish eaters. As the oysters can be collected only by raking them up from pretty deep water, these ancient savages must have known how to make boats; but, without the use of iron or other metal, their boats could have been only canoes, formed of trunks of trees hollowed by means of fire, or made of bark, like those of the North American Indians.

The bones which contained marrow are all split in a very ingenious manner, and, as the inhabitants of Lapland now split bones in the same manner for the purpose of procuring the marrow, it is inferred that this was the motive for the operation in those ancient times.

Comparative anatomy enables all the bones to be identified with absolute certainty. The most numerous are those of the deer, the roebuck and the wild boar, but bones of the beaver, wolf, fox, lynx, wildcat and others are also found. The presence of the bones of the swan proves that the inhabitants dwelt in the country during the winter, as the swan migrates to higher latitudes on the approach of warm weather.

No human bones are found, but the existence of enormous tombs belonging to this age of stone shows the great respect which was paid to the remains of the dead, and accounts satisfactorily for the absence of human bones among their kitchen refuse. This absence shows that these savages were not cannibals. The remains of human industry found in the shell heaps are exceedingly rude—coarse pottery which was not formed on a wheel, and pieces of flint roughly chipped into forms manifestly intended for knives, hatchets and spear heads. From the material of which the implements are formed this period is called the AGE OF STONE.

Evidences have been found of two subsequent periods which, from the materials in use, are called the Age of Bronze and the Age of Iron. As our article is already too long, we shall reserve a description of these to another week.

BARTLETT'S NEW HOT-AIR FURNACE.

On page 113, Vol. IV., SCIENTIFIC AMERICAN, we published an illustration of Bartlett's new gothic furnace for dwellings, &c., which conveys a clear idea of its peculiar construction. During the past winter we have had some practical experience in the use of the invention, which fully justifies the high opinion concerning its merits which we had previously expressed. This furnace has few joints, and these, by a simple contrivance, always remain gas tight, while the construction is such that the expansion and contraction of the metal cannot even under great heat result in breakage. The gothic top presents a very large area of radiating surface, without any tendency to overheating. For schools, churches stores and dwellings this invention has few equals. Bartlett & Lesley, proprietors, No. 426 Broadway, N. Y.

GREAT PRODUCT OF IRON.—Blast Furnace No. 3, of the Lackawanna Iron and Coal Company, at Scranton, Pa., made, during four weeks, the largest amount of iron ever produced in that length of time by a single furnace in the United States, and probably in the world; the yield of the last week amounting to 375½ tuns. For the week ending Jan. 25, 356 tuns; for the week ending Feb. 1, 342 tuns; for the week ending Feb. 8, 357 tuns; for the week ending Feb. 15, 375 tuns—average, 357½ tuns. This furnace is 50 feet high, 19 feet in diameter at top of boshes, and is blown through 18 tuyeres, with seven pounds pressure of blast.

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THE NEW GUNS FOR THE NAVY.

While the English navy is being armed with guns of very complex structure, those of the American navy have for several years been growing more and more simple. At first the plan of having ornaments cast upon them was abandoned; then the enlargements in the form of bands around the muzzle and other parts were dispensed with; and now, as the last possible step in this direction, they are cast without trunnions, making the cannon a smooth lump of cast iron, without any ridge, corner or projection upon it. This modification is the subject of Dahlgren's last patent. He forms the trunnions of gun metal, cast in connection with a strap passing around the breech of the cannon, and secured by a hoop of the same material passing around the cannon near the trunnions. At the Brooklyn Navy Yard there are a number of guns constructed in this manner, and several have been put on board of our naval vessels. In our opinion they are the best cannon that have ever been made.

It has long been known that corners or angles in the surface of cast iron rendered it much more liable to break. The rollers of rolling mills are now turned with a curve at the shoulder of the journal, it having been found that they were apt to break at this point; and the introduction of a curve occupying only half an inch in the length of the roller is said to increase the strength about 30 per cent.

The liability to break at the corners is greatest when the metal is subjected to blows or concussions, and is especially marked in cannon. This has been the reason for dispensing with ornaments and projecting rings, and for several years our service guns have been cast with no angles except those at the junction of the barrel with the trunnions. It being observed, however, that the guns were very apt to fail at this point, Commander Dahlgren was prompted to devise some mode of overcoming the difficulty. That which he has adopted seems to be as simple and efficient as it is possible to imagine, and gives a very perfect cannon.

In the present state of knowledge in relation to ordnance, the question seems to be between the guns of Dahlgren and those formed of a cast-iron core surrounded with wrought-iron or steel bands, on the plan of Prof. Treadwell, Blakely and Parrott. We have heard it suggested by one of our most intelligent mechanics that if the band is made of wrought iron it may take a permanent set from the momentary expansion of the elastic cast iron, and thus become loosened. He states that he has repeatedly broken a string by tying it very tightly round a thin gun barrel and discharging the gun, demonstrating the fact of such momentary expansion.

STEAM ENGINES ON COMMON ROADS IN SOUTH AMERICA.

In 1861, two of Boydell's traction locomotives for common roads, were imported into Venezuela by Messrs. Willet and Las Casas, who had obtained a grant for the exclusive use of such engines on all the roads of the Republic for ten years. Each engine weighed eleven tuns, and had cylinders of 7-inch diameter, and 20-inch stroke. The great peculiarity of these engines consists in each having two large driving wheels, which carry an adjustable endless jointed railway. On the Venezuela engines each driving wheel is 6 feet in diameter, and there are two small steering wheels in front. The large driving wheel was furnished with 96 teeth on an inner rim, and it received its motion from the piston through pinion gearing, similar to that of several engines for common roads which have been illustrated in the SCIENTIFIC AMERICAN. The parts of the two engines were put together at La Guayra, and their route was to Caraccas, distant only seven miles in a straight line, but 27 miles by the wild, crooked mountain road, which rises one foot in seven, and attains a total elevation of 7,000 feet. We have been informed by a gentleman from Venezuela, that these engines traveled up this steep road, drawing several cars with perfect safety, and yet it is a dangerous pathway for single horse carriages, as it is so narrow in some places that there is scarcely a foot to spare between the pathway and precipices one thousand feet in depth. The people of Caraccas were astonished when they beheld these engines traveling up their mountain road, entering their town, and turning their narrow streets with perfect ease drawing ten wagons loaded with coal behind them. This is the greatest feat of mountain traveling, we believe, that has ever been performed by the steam engine.

RECENT AMERICAN INVENTIONS.

Submitting Yarns to the Action of Liquids.—The principal feature of this invention consists in the use of two reels, arranged upon the same shaft, with the slats of one alternating with those of the other; one of the said reels being arranged eccentrically to the other, and the slats of one having longitudinal reciprocating movements; the object being to wind the yarn or thread spirally upon the reels, and keep shifting the spiral coils gradually toward one end of the reels, from whence it is delivered. The reels may revolve in a liquid for subjecting the yarn or thread to the action thereof (dyeing, sizing, &c.,) or may revolve in the air for drying the yarn or thread, after having been subjected to the operation of a liquid. Patented by Paul Heilmann, Mulhouse, France.

Repeating Firearms.—This invention, patented by E. M. Judd, of New Britain, Conn., relates to effecting the loading at the breech from a magazine of cartridges in the stock of the firearm, by the act of withdrawing a slide by which the breech is closed for firing. It consist, first, in certain means operating in combination with the said slide, to transfer the cartridges, one at a time, from the magazine to the barrel. It also consists in certain means operating in combination with the said slide and the loading apparatus, for the purpose of effecting the cocking of the hammer, that the loading and cocking operations may be effected by the movement of the trigger guard lever.

Liquid Vessels.—The object of this invention is to obtain a simple means of drawing coffee, water and other liquids from portable vessels, without having to draw from a faucet, or to raise or tilt the vessel, and it consists in having an inner shell, which is open at the bottom, and provided with an opening and valve in the top, suspended within the vessel from the lid or cover of the same by a helical or coil spring, the liquor being drawn from the vessel by simply depressing a short spindle, which, first closing the opening in the top of the shell, forces it down, and simultaneously therewith causes the liquids to discharge through the spout. Patented by J. Lawson Treat, of New York City.

Cheese Vat.—This invention, patented by F. X. Manahan, of Utica, New York, relates to an improved arrangement of means for heating the milk vat, or rather its contents, to a proper temperature, by means of a boiler or heater, so arranged in connection with pipes, cocks, and a supplemental or hot-water chamber, that the ontents of the milk vat may be heated and graduated with great exactness or nicety, and the result attained with the least possible expenditure of time and fuel. It also relates to an improved means employed for keeping the hot-water chamber tight around the cock or faucet, through which the whey is drawn from the milk vat.

Foundations for Lighthouses, Coffer Dams, &c.—This invention, patented by Louis Bail, of New Haven, Conn., consists in the employment or use of cast-iron plates, of segment form, provided at their inner concave side with flanches, to admit of the insertion of bolts to secure the plates together, and thereby form a strong metal cylinder, which, while in the course of construction is gradually filled with concrete or other suitable material. The object of the invention is to obtain a ready means whereby foundations for lighthouses and other structures, as well as coffer dams may be built of a material previously prepared, and which may be conveniently transported and expeditiously put together to form the foundation or structure suitable for sandy foundations.

Foot Warmer.—The object of this invention, patented by Solomon Hunt, of Danville, Indiana, is to obtain a simple, economical and portable device for warming the feet of a person in any apartment of a dwelling, or while traveling in any vehicle, which has the means of generating warmth in itself, and it consists in a peculiar arrangement of a radiator in a box or other case, in connection with a foot rest and flame of a spirit lamp, for throwing the heat of the gases from the flames by radiation, direct upon the soles of the feet.

Improvements in Cannon, &c.—This invention, patented by B. T. Babbitt, of New York City, consists in the construction of a piece of ordnance with a passage winding spirally round the bore and within the walls thereof, to serve for a circulation of water or air for the purpose of keeping the piece cool when in use, and for the purpose of cooling the casting in the manufacture of the piece.

Great Gas Explosion in Paris.

On the last day of the old year, 1861, a very disastrous explosion of gas occurred in the new and splendidly fitted-up casino of the Rue Cadet in Paris, by which four persons were killed, seventeen others were more or less seriously wounded, and valuable property to a large amount was destroyed. The premises were lighted with portable gas supplied by the Paris Portable Gas Company, which gas is made from coal or other materials that produce a highly illuminating gas, and is compressed to four atmospheres in large strong vessels which are sent from the works to charge smaller receivers on the premises of the consumers. Several of the large *cafés* in Paris are thus lighted by the Portable Gas Company, which supplies about 1,000 customers. M. Peregalla, the manager of the casino, became aware on the day previous to the accident that there was an escape of gas somewhere on the premises, and a workman named Basta, in the employ of the Portable Gas Company, was sent for to examine the apparatus. The meter was found to require cleaning or repair, and on the following morning, he commenced the work, which he continued till about a quarter to five o'clock, when suddenly a loud noise gave warning of a dangerous escape of gas. One of the servants of the establishment immediately ran to the receivers, which were placed near the top of the building, to turn the safety stop-cocks. He had just time to descend when a terrible explosion shook the whole neighborhood; the roof of the front saloon was blown up, and the shops in the vicinity were much damaged. The counter in a wine seller's shop, next to the casino, was forced more than a yard from its place, and killed a workman who was drinking a glass of wine close to it. After the explosion, the premises took fire, and the flames burst out with such fury that notwithstanding the prompt assistance of the firemen, much property was destroyed, and the beautiful saloon which had cost $80,000 was reduced to ruins. The gas company's workman was killed by the explosion, and his body was found on the ruins burnt to a cinder. Another man who was close to him was also killed; and as they were the only persons near the apparatus, it cannot be ascertained how the leak of gas took place. It is stated by those who heard the explosion that several detonations, like the reports of 64-pounders, took place one after another for about twenty minutes. The street was filled with ruins, and the people were terror-stricken. Suits have been commenced against the Portable Gas Company for damages they being the cause of the disaster through a defective gas receiver.

Secession Compliment to Our Navy.

The Richmond *Dispatch* of the 22d of Feb. pays the following extraordinary compliment to the Federal navy. We quote:—

There is no disaster of the present war which it is so difficult to bear with any degree of patience or philosophy, as the almost uniform success of the enemy's gunboats over our land batteries. It is a thing absolutely unprecedented in its extent, in the history of warfare. In nine cases out of every ten which have ever occurred before, land fortifications have driven off vessels as often as they attacked them. In the Russian war the immense steam navies of England and France were beaten by the Russian fortifications in almost every encounter.

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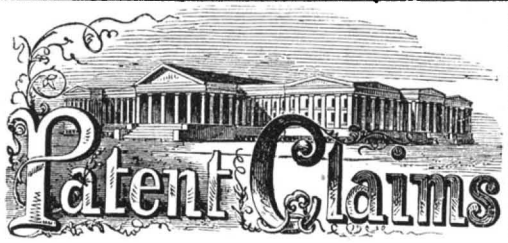

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING FEBRUARY 25, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

34,472.—B. T. Babbitt, of New York City, for Improvement in the Construction of Ordnance:

I claim the construction of a piece of ordnance with a passage, a, winding spirally round the bore, and within the walls thereof, substantially as and for the purpose specified.

34,473.—N. Badger, of Shelbyville, Ky., for Improved Digging Machine:

I claim the combination of the oscillating guide, I, arms, d, and crank, G, with the cylinder, F, as and for the purpose shown and described.

I also claim the combination with the parts of the pulverizing rollers, N P, as shown and described.

[This invention is designed for spading or digging the ground for agricultural purposes, and also for digging potatoes and other similar crops or roots.]

34,474.—Louis Bail, of New Haven, Conn., for Improvement in Construction of Foundations for Light Houses, Piers, &c.:

I claim constructing the foundations and other portions of light houses, coffer dams and other similar structures of cast-iron segment plates, A, provided at the inner or concave side, with flanches, a a′, to receive screw bolts, c, for the purpose of securing the plates together to form a cylinder, and then filling the cylinder with concrete, stone, or other suitable material, substantially as set forth.

34,475.—J. L. Beers and Samuel Leonard, of Fayette, Pa., for Improvement in Water Wheels:

We claim the concave chute, F, arranged as described, in combination with the superincumbent penstock, C, and the wheel, A, substantially as and for the purpose set forth.

34,476.—W. H. Bliss, of Newport, R. I., for Improvement in Hose Couplings:

I claim, first, Connecting the nut, D, with the pin, F, by means of the divided collar, E, fitted in the nut and to the pin, substantially as shown and described, when said connection is used in combination with the pin, F, and the groove, g, of but, B, for the purpose specified.

Second, The lug, G, within the but, A, when used in connection with the pin, F, and the groove, g, of the but, B, substantially as and for the purpose set forth.

[This invention relates to a certain improvement in a hose coupling, for which Letters Patent were granted to Robert B. Lawton and William H. Bliss, the latter being the party to the present application; said original Letters Patent bearing date Feb. 22, 1859. This coupling has been adopted in Brooklyn, and the Chief Engineer of the New York Fire Department has recommended its adoption in this city in place of the old screw coupling now in use. The object of this invention is to obtain a swivel coupling, which will admit of a secure and water-tight connection.]

34,477.—J. S. Briggs, of South Bend, Ind., for Improvement in Mode of Starting Street Cars:

I claim the application to street cars of friction drums and arms, in combination with spiral springs, for the purpose of acquiring and retaining power, in stopping the car, to start the same again, in the manner described.

34,478.—C. G. Case and J. M. Baker, of Battle Creek, Mich., for Improvement in Automatic Machines for Weighing Grain:

We claim the combination of the boxes, C C′, discharge valves, E E, arms, f f, connecting rod, g, with the valve, k, passages, i j, and spring latches, o, when arranged and operating in the manner and for the purpose set forth.

[This invention relates to that class of grain-weighing machines in which the weight of the machine is made to automatically open and close valves for regulating the supply and discharge of the same.

34,479.—H. Cassel and W. F. Semple, of Fredricktown, Ohio, for Improvement in Bellows for Blowpipes:

We claim the chamber, D, acted upon by spring, k, in combination with the chambers, B and C, and air-conveying tube or pipe, I.

34,480.—C. T. Chester, of New York City, for Improvement in Alphabetical Telegraphs:

I claim, first, The use in alphabetical telegraphs of a train of wheels actuating an escape wheel, in connection with pallets, actuated by electromotive force, when these parts are combined to operate an indicating needle, substantially in the manner set forth.

Second, The handle or pointer, with its hollow shaft, ratchet wheel, toothed wheel, two springs, with adjustable points, combined substantially as described, and forming the transmitting apparatus.

Third, The arrangement for combination of these two parts of the complete instrument, so that one dial answers for receiving and transmitting apparatus, and the parts may be instantly separated and examined, substantially as described.

34,481.—John Christy, of Baltic, Conn., for Improved Smoothing Iron:

I claim the handle, E, bar, G, gravitating catch, i, latch projection, j, and legs, C D, provided with feet, c d, in combination with the oblong mortise, B, ledges, a b, and iron, A, when arranged to operate in the manner and for the purpose set forth.

[The object of this invention is to provide a ready means of detaching the handle from the iron, to enable it to be kept cool while the iron is being heated, and also to make one and the same handle answer for a whole set or a number of irons of different sizes.]

34,482.—C. B. Conant, of Hardwick, Mass., for Improvement in Lifting Jacks:

I claim, first, The combination with the stand, A, and screw, C, of the boss or hub, D, collar, G, and internal projection, a, substantially as and for the purposes set forth.

Second, The combination with the screw, C, and stand-to of top or hub, D, projection, a, nut, E, pawl, J, guide collar, G, holding collar, K, and the pawl frame, H, substantially as and for the purposes set forth.

34,483.—Suspended.

34,484.—E. D. Foss, of Maineville, Ohio, for Improved Evaporating Pans for Saccharine Juices:

I claim, first, The series of small, equidistant apertures, H, when used in the described combination, with separate lever gates, I I I, and all constructed and arranged in the manner and for the purposes shown and explained.

Second, The arrangement of draft board, M, rod, N, and tube, O, in the described combination, with the last evaporating pan or compartment, for the purpose of moderating the heat thereto, as explained.

Third, The provision of surface sluices, J, constructed as described for the easy discharge of scum, in the manner described.

Fourth, The combination of the two batteries, A and A′, placed side by side, one higher than the other, when, in other respects constructed and arranged in the manner shown and described and for the objects stated.

34,485.—J. G. Fredenburr and J. L. George, of Columbia, Cal., for Improved Water Wheel:

We claim the arrangement of the ledges, h, and the guide plates, i, with the sliding buckets, d, chute, E, and its enlargement, g, as shown and described.

The arrangement of the encompassing bar, F, with the buckets, d, and the chute, E, as shown and described.]

[This invention relates to an improvement in that class of water wheels which are more particularly designed for operation under a small head of water, and are commonly termed undershot wheels. The object of this invention is to apply the water to the wheel in such a manner that the same will act more efficiently on the wheel than hitherto, and to this end there is employed a close-fitting chute to the lower part of the wheel, and the latter is provided with sliding buckets, arranged in a certain relation with an eccentric guide.]

34,486.—J. R. Gill and W. E. Palmer, of Alton, Ill., for Improved Washing Machine:

We claim the combination and arrangement of the two toggles, G I, with the handle, J, bar, H, swinging pressure board, D, stationary inclined board, E, and suds box, A, substantially as and for the purpose set forth.

[The object of this invention is to obtain a clothes-washing machine of simple construction, which will operate in a very efficient manner, and be capable of being manipulated in the most advantageous way, so that the operator while working the machine may have full command over the clothes, and adjust them as may be desired. An engraving of this machine will appear in our next issue.]

34,487.—Charles Goldthwait, of South Weymouth, Mass., for Improved Clothes-Drying Apparatus:

I claim the two swinging cranes, C C, provided with the pins, f, and attached to the dwelling, A, in connection with the connecting rod, D, lines, D′, and retaining bar, E, all arranged substantially as and for the purpose set forth.

[This invention consists in the employment or use of two cranes attached to a dwelling, one at each side of a door or window thereof; the cranes being provided with pins and lines, a connecting rod and a stay or retaining bar, whereby the lines may be readily adjusted on the pins of the cranes, and the clothes readily placed on the lines from the door or window.]

34,488.—Ashman Hall and John Faulkner, of Dansville, N. Y., for Improvement in Fanning Mills:

We claim making that portion of the sieves of fanning mill shoes which is exposed to the action of the fan blast, concave longitudinally, as shown, for the purposes set forth.

34,489.—H. Hall, J. Hall, T. Hall and H. Hall, Jr., of Philadelphia, Pa., for Improvement in Metallic Cases for Pictures, Cards, &c.:

We claim the new article of manufacture described, consisting of a metal case, composed of a cast metal frame and sheet metal top and bottom or sides, substantially as set forth.

34,490.—William Hamilton, of West Pittsburgh, Pa., for Improvement in Mode of Securing Wheels to Axles:

I claim the use of a nut for securing wheels to axles, composed of two or more sections of a metallic ring, fitting into a groove in the axle in such manner as to fill the entire circumference of the groove, the sections of the nut being united and held in place independently of and detached from the pipe box or hub of the wheel, substantially in the manner and for the purpose described.

34,491.—A. H. Hastings, of New York City, for a Piano:

I claim, first, The employment of the scale, B, so inclined that I can use the simplest and most effective form of action of the horizontal piano, while I obtain all of the advantages of the upright piano, substantially as set forth.

Second, The employment of the hammer, C, constructed and used as and for the purpose specified.

34,492.—J. P. A. Havard and J. B. Bourgoise, of Paris, France, for Improvement in Portable Filters:

We claim, first, A filtering apparatus, consisting of two receptacles, B C, formed of flexible water-proof fabric, filtering medium, D, and wire gauze or perforated metallic disks, c d, when combined and arranged, in the manner substantially as described.

Second, The sliding tubes, n o p q, arm, n′, and bail, m, arranged in combination with receptacle, B, to operate substantially as described.

Third, The flexible sides of the receptacles, B C, sliding tubes, n o p q, case, H, and packing case or bucket, I, combined and arranged in the manner and for the purpose set forth.

34,493.—W. H. Havens, of Paterson, N. J., for Improvement in Projectiles for Rifled Ordnance:

I claim the combination with the conical portion of the part, B, and the part, A, of the independent sliding packing segments, C C, all arranged and operating as shown and described.

[This invention consists in the employment for obtaining the rotary motion of a projectile in its passage along the grooves of a gun of a series of segments, combined with a conical portion of the projectile, whereby they are caused to be expanded into the grooves of the gun, by the act of driving home the projectile in loading, or by the action of the pressure of the gases against its base when the discharge of the gun takes place, but to remain permanently attached to the projectile in its flight. It also consists in certain means whereby a soft metal band applied to a projectile is made to secure to the body of the projectile the follower through which the expansion of the said band is produced.]

34,494.—Paul Heilmann, of Mulhouse, French Empire, for Improvement in Machinery for Submitting Yarns to the Action of Liquids. Patented in England Oct. 15, 1857:

I claim submitting yarns or threads to the action of gaseous and liquid bodies for the several purposes described, by means of a system of reels, operating substantially as set forth.

34,495.—J. N. Hawkins, of Islip, N. Y., for Improved Clam Opener:

I claim, as an improved article of manufacture, a clam-opening instrument, composed of a base plate, A, standard, B, with guide arms, b b, and a knife, C, pivoted to the standard at a, all as shown and described.

[The object of this invention is to obtain a simple and efficient device for opening clams, round or hard clams, and which require a considerable effort in order to be opened with an ordinary hand knife, as the shells are quite thick and hard and not readily pried apart. It also consists in pivoting a knife of suitable construction in an upright provided with guides, the uprights being attached to a suitable base or block, and the whole being constructed and arranged as to effect the desired end.]

34,496.—C. F. Hendee, of Waterbury, Conn., for Improvement in Hoop Skirts:

I claim as my invention in fastening metal hoops of hoop skirts, the indented metal fastening, in combination with a metal hoop, of a hoop skirt, provided with a hole to receive the indentation of the fastening, substantially as described, and for the purpose of preventing the fastening frame slipping from the hoop, substantially as set forth.

34,497.—A. B. Hendryx, of Seymour, Conn., for Improvement in Hollow Augers:

I claim, first, The eccentrics, i, for adjusting the cutters of a hollow auger, in combination with the screws, j, cutter heads, f, and dogs, a, when arranged to operate, substantially as described.

Second, The combination of the V-shaped scroll, g, and conical or taper pins, e, with the inner flange, c, of the dogs, slotted face plate, B, and wedge nut, D, when arranged to operate in the manner described.

[This invention consists in an eccentric device for setting up or adjusting the cutters as they wear away by use.]

34,498.—F. Hollen and A. H. Pierce, of Blairsville, Pa., for Improved Screw Wrench:

We claim a burr wrench with two jaws, A A′, the inner surfaces of which are provided with ratchet teeth, b b′, and which are united by a hinge joint, a, and forced together by a suitable spring, C, in the manner and for the purpose shown and described.

[This invention consists in giving to the inner surfaces of two jaws the form of racks with ratchet teeth pointing in opposite directions, said jaws being connected by means of a hinge joint and forced together by a suitable spring in such a manner that a wrench is obtained which can be readily applied to burrs or small nuts of various sizes, and which can be operated with facility.]

34,499.—John Holmes, of Boston, Mass., for Improvement in Coal Sifters:

I claim the flexible sifter constructed substantially in manner and so as to operate as specified.

34,500.—Nestor Houghton, of New York City, for Improved Spring Bedstead:

I claim, first, The combination and arrangement of the elastic laths made and constructed as described, with spiral springs, substantially as and for the purpose described.

Second, The combination with the laths, 6 6′ 6″, 6‴, of the oscillating cross pieces, 8, the parts being constructed, arranged and operating substantially as set forth.

34,501.—Solomon Hunt, of Danville, Ind., for Improvement in Foot Stoves:

I claim the combination of the radiator, B, reflectors, g h, and foot supports, C C, with the lamp, D, when operating in the manner substantially as described for the purpose set forth.

34,502.—W. Johnson and Henry Davies, of Brooklyn, N.Y., for Improvement in Bakers' Ovens:

We claim the application to an ordinary baker's oven, wherein the fire heat can pass directly into and through the oven, of the flues, a a, A and B, and dampers, h k f b and c, arranged in the manner and for the purposes set forth.

34,503.—Gilman Joslin, of Boston, Mass., for Improvemen in Heaters:

I claim, first, Varying the temperature of the fire just in proportion to the quantity and temperature of the external air supplied to the furnace by means of a rod, plate or bar so arranged as to have the air, so admitted, keep in contact with it and cause the expansion and contraction of the said rod, plate or bar, thereby regulating the draft of the fire, as set forth.

Second, In heating apparatus constructed to operate substantially as set forth, I claim the arrangement of the lever arm, so that it can readily be inserted in or removed from its place by providing said lever with the projections, v and w, to fit into suitable sockets in the pieces which compose its fulcrum, as described.

34,504.—E. M. Judd, of New Britain, Conn., for Improvement in Repeating Firearms:

I claim, first, The loader, G, constructed and applied in combination with the magazine and barrel, as described, and combined with the breech slide, C, by means of a rack and pinion to be operated by the act of opening the slide, substantially as set forth.

Second, Combining the hammer by the breech-slide, C, and the loader, G, by means of a dog, k, tooth, i, and a system of rack and pinion gearing, substantially as and for the purpose specified.

34,505.—W. S. Kelly, of Schenectady, N. Y., for Improvement in Pumps:

I claim, first, The combination with the chambers, A B, of a double-acting pump, of a hollow piston rod, G, and piston, F, the valves, g, of the piston, F, being arranged between upper and lower passages, d i, and the same set of valves, g, serving alternately for closing said upper and lower passages, substantially as and for the purposes described.

Second, The combination of an annular spider, H, and screw plate, I, with the hollow piston, F, and ball valves, g, substantially as and for the purposes set forth.

Third, constructing the annular spider, H, with its arms, f, of greater depth than the depth of its ring or hollow hub, e, substantially as and for the purposes set forth.

Fourth, The combination of the base valve box, D, having a narrow stop bar, a, over the center of each of its valve chambers, with the double-chambered pump, A B, hollow piston, F, and piston rod, G, substantially in the manner and for the purpose described.

Fifth, The combination of the hollow piston, F, and hollow piston rod, G, with a stationary air chamber, J, by a stuffing box, j, at the lower end of the chamber, J, substantially as and for the purposes set forth.

34,506.—Gabriel Farner, of Marion, Pa., for Improvement in Apparatus for Bending Tires:

I claim the combination of the middle roller, H, the sliding frame, the guides and central screw, d, with the scale, Fig. 1, and index bar, c, or its equivalent, substantially as specified.

34,507.—C. T. Judkins, of Boston, Mass., for Improvement in Gas Regulators:

I claim the combination and arrangement of the valve, H, with the pivoted or hinged cover, E, the lever, O, and adjustable balance weight, L, substantially as and for the purpose and objects set forth.

34,508.—Hervey Kent, of Lewiston, Maine, for Improvement in Sliver Guides for Carding Engines:

I claim the application of the sliver guide or hole, A, to a carrier, G, or its trough, by means of a circular plate, B, or its equivalent, so as to be capable of being moved across the said carrier or trough, as the case may be, in a circular or curved path, substantially as and for the purpose of attaining results, as set forth,

I also claim the combination of the circular ranges of teeth, b b b c c c, or their mechanical equivalents, with the guide plate, B, and the trough thereof, the same being arranged for the purpose and to operate substantially as specified.

34,509.—Edmund Lockwood, of Ulster, Pa., for Improved Shot Hole Stopper:

I claim a shot plug consisting of a metallic plate or disk the outside of which is convex, the inside lined with an elastic covering having a spindle with bearded side springs and a screw at its end with a cross bar in which the end screw is inserted; the parts being constructed and arranged relatively to each other, substantially as and for the purposes specified.

34,510.—Samuel Loring, of Duxbury, Mass., for Improvement in Machines for Leathering Tacks:

I claim the spiral conveyer, I, in combination with the slotted bar, M, or its equivalent, for the purpose of separating and conveying the tacks, as set forth.

Second, I claim the spring, b, in combination with the cam, g, for the purpose of carrying the tack round to the nippers, as set forth.

Third, I claim the box, h, in combination with the nippers, operating as set forth for the purpose described.

Fourth, I claim the punch, C2, so constructed as to cut out the leather and force it down upon the tack, as set forth.

34,511.—F. X. Manahan, of Utica, N. Y., for Improvement in Cheese Vats:

I claim, first, The perforated pipe, M, placed longitudinally at the bottom of the box, A, and communicating with the pipe, K, substantially as shown, for the purpose of equally distributing the ascending hot water from the boiler, I, as set forth.

Second, The arrangement of the pipes, K K′, cocks, h h′, and pipes, O L, with the boiler, I, water boxes, A C, and milk vat, E, as shown and described.

Third, Securing the cock, F, to the milk vat, E, through the medium of the pipe, G, and screw socket, H, arranged substantially as shown and described.

34,512.—Wm. Mason, of Providence, R. I., for Improvement in Connecting and Disconnecting Shafting:

I claim, first, the two rims united, A, or equivalent, forming the V-shaped recess, when used in combination with the wedge segments, C C, and toggle-jointed connections, as described, substantially as specified.

Second, I claim the wedge segments, C C, when used in combination with the arms, disk and sleeve, as described, for the purposes set forth.

Lastly, I claim the application of the above described mechanism to shafting, gears or other wheels rotating upon the shaft, for a friction coupling, substantially as specified.

34,513.—W. M. Mason, of Polo, Ill., for Improvement in Machines for Stacking Hay:

I claim the combination of the toggles, I, pulleys, l m, and rope, J,

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with the fork, H, constructed as described, in the manner and for the purpose shown and set forth.

[The object of this invention is to obtain a portable and simple device which may be readily put up and adjusted in the field for stacking grain, hay, stalks, &c., in a very expeditious manner, far more so than by the usual exclusively manual process.]

34,514.—Ira McDaniel, of Salem, Iowa, for Improved Washing Machine :

I claim the application of the crank, C, and shaft, D, to the lower section of the washboard, A, giving it the vibratory motion in the rectangular tub, R, all arranged and operating substantially as and for the purpose specified.

34,515.—E. B. McCoy, of Winsted, Conn., for Roller Press for Photographs, &c. :

I claim the combination of the reciprocating bed, C, roller, F, and frame, E, when arranged substantially as and for the purpose set forth.

[The object of this invention is to obtain a simple and efficient roller press for pressing and polishing photographs, mangling clothes, printing and analogous purposes for which such presses are generally used.]

34,516.—Nelson McCuen, of South Potsdam, N. Y., for Improvement in Harrows :

I claim a drag having the evener, E, supported upon adjustable rollers, and having the bars, a, bent at obtuse angles to the bars, B, the teeth being arranged to said bars, as set forth, and the whole constructed otherwise as shown and described.

[The object of this invention is to obtain an implement which will open up the soil and work the ground into a perfect tilth by being passed over it simply once.]

34,517.—J. Vaughan Merrick, of Philadelphia, Pa., for Improved Slide Valves for Steam Engines :

I claim a slide valve and balancing plate in combination with a double-ported cylinder face, when the said valve is provided with such openings, and the said balancing plate with such chambers and ports as to permit the steam to pass to and from the cylinder, substantially in the manner set forth.

34,518.—O. E. Miles, of Aurora, Ill., for Improvement in Construction of Wheeled Vehicles :

I claim the arms, C C, having the wheels, B B, permanently attached to them, and their inner journals fitted in boxes, F, suspended on trunnions, l, and their outer journals fitted in boxes, D, placed in frames, E, attached to the bolster, when said parts are used in combination with the rods, f, arranged substantially as shown for bracing the frames, E, and with the frame, m, in which the trunnions, l, are placed and also with the levers, r r, arranged substantially as shown, for securing the trunnions, l, on frame, m, as and for the purpose set forth.

[This invention relates to a new and improved manner of hanging the wheels of the vehicle and arranging the same, whereby many advantages are obtained over the old mode of construction.]

34,519.—Jehiel Munson, of Burlington, Vt., and J. R. Lyon, of Shelburne, Vt., for Improvement in Potato Diggers :

We claim the arrangement of the adjustable separating rods, F, in combination with the perforated flange or lip, 4½, the perforated frame, D, and separator clasp, E, substantially in the manner, and for the purpose specified.

34,520.—David O'Flanagan, of Charlestown, Mass., for Improved Fruit Strainer :

I claim the box, A, provided with a concave perforated bottom, a, in combination with the curved rotating bar, or stirrer, E, when suspended from the cover, B, and constructed, arranged and operated as and for the purpose set forth.

34,521.—W. J. Palmer, of Flushing, N. Y., for Improvement in Lamps, &c. :

I claim the combination with the cold air or draught chamber, C, of the dome-shaped gas-condensing channel, c, as and for the purpose shown and described.

[This invention relates to an improved lamp for burning coal oil without a chimney, and has, for its object the supplying of the flame with a requisite amount of oxygen to support proper combustion by a very simple means, and one by which the vapor or gas in the upper part of the lamp will be condensed as it ascends, thereby preventing not only explosions which are liable to occur in burning the lighter grades of oil, but also preventing the escape of the vapor or gas from the lamp and the consequent waste of the oil. The invention also relates to an improvement in the wick-elevating device whereby the same may be actuated without burning the fingers. This very useful burner may be seen at Jas. Quarterman's, 114 John street, and applications for purchasing or right to manufacture, may be sent to W. S. Palmer, Flushing, N. Y.]

34,522.—Suspended.

34,523.—Joseph, Reichman and Heinrich Kriete, of Chicago, Ill., for Improved Governor Valve :

We claim, first, The use of the steam of the boiler and that of the engine acting against each other, to operate the governor valve or its equivalent of a steam engine.

Second, The peculiar construction and combination of the whole governor, as described.

34,524.—John Revere, of Roston, Mass., for Improvement in Preparing Metallic Molds for Casting Metals. Antedated Nov. 22, 1861 :

claim, in preparing a metallic mold for casting ordnance or articles of bronze, not only heating the mold so as to anneal it and burn and oxydize its inner surface, but in afterward applying to the said surface, the earthy wash, and to the latter a resinous coating, substantially as specified.

34,525.—R. A. Riley, of Greenfield, Ind., for Improved Mode of Preventing Jarring and Jolting Railroad Cars and Locomotives :

I claim the faced flange on the car wheels of uniform depth. The low rail on the chair on the inside of the track lapping the head joints of the rails to support the car on the flange of the wheel while passing over the same. The face on the frog and the face on the switch to receive and support the car on the flange of the wheels while passing over the head joints and open spaces thereon, and all these in combination fitted and adapted to each other ; by which all open spaces in the track of railroads are practically closed, and the even plane of the cars in motion upon the track at all points maintained.

34,526.—Thomas Rogers, of Montgomery Square, Pa., for Improvement in Liquid Measures :

I claim the measure, A, with its piston, G, and the movable cap, D, with its tube, c, the whole being constructed and arranged substantially as and for the purpose set forth.

34,527.—Daniel Sager, of Albany, N. Y., for Improvement in Self-Acting Brakes for Wheel Vehicles :

I claim the combination of the curved links, C C, with the pole, A and levers, D, as shown and described. The arrangement of the levers, D D, to slide longitudinally as well as turn circularly upon the axis pin, as shown and described.

[The object of this invention is to obtain a brake for wheel vehicles which will be self-acting, that is to say, operate under the draught movement of the team and the gravity of the vehicle and its load, so as to require no special manipulation on the part of the driver.]

34,528.—Andrew Sawyer and Henry Barnes, of Burlington, Wis., for Improvement in Cultivators :

We claim the arrangement of the pendulous suspended frame, C, attached draft pole, F, shares, E, rods, D, and chains, D' D', with the segments, K K, rock shaft, I, and lever, J, in the manner shown and described.

[This invention relates to an improved cultivator which may be applied to the axle of an ordinary wagon. It presents many advantages over the ordinary ones in use.]

34,529.—E. S. Scripture, of New York City, for Improvement in Oil Cans :

I claim, first, the use or employment of the protecting ring, C, provided with the spring rests, D D, arranged and operating as shown for the purpose specified.

Second, The bottom, B, regulating screw, H, and spring, F, supported upon the rests, D D, or their equivalents, when the same shall be combined and operated in the manner and for the purpose specified.

34,530.—Melvin Shaw, of Abington, Mass., for Improved Composition for Dressing Leather :

I claim a dressing for leather, consisting of an alkaline solution of shellac, in combination with a solution of logwood.

34,531.—S. J. Sherman, of Brooklyn, N. Y., for Improvement in Springs for Ladies Dresses :

I claim a spring or busk for clothing, having the ends covered by a soft metal applied and secured substantially in the manner specified and for the purposes set forth.

34,532.—D. H. Shirley, of Boston, Mass., for Improved Railroad Switch :

I clain a portable switch having as its essential elements a curved inclined way or groove, in combination with a suitable locking or clutching device for securely holding the switch firmly upon the rail, substantially as described.

34,533.—S. J. Taylor, of Rome, N. Y., for Improved Convertible Straw Cutter and Corn Sheller :

I claim the bed piece, B, gear wheel, D, pinion, F, spiral ribs, b, and drum, A, combined, arranged and adapted for the attachment of the spirally-ribbed feed plates, j, or spiral knives, G, all as and for the purposes substantially as described.

[The object of this invention is to so combine a straw cutter and corn sheller in one machine as to require but little, if any, more machinery for both than is usually required for either alone, the machine being adapted to work in either capacity and with equal efficiency by a simple substitution of some of its parts.]

34,534.—W. H. Van Gieson, of New York City, for Improvement in Nails for Sheathing :

I claim a sheathing nail made with converging flanges and with grooves between the flanges, said flanges converging at the point of the nail and the grooves terminating a short distance below the head, as shown and described.

[The object of this invention is to obtain a sheathing nail which will hold better than those of ordinary construction, that is to say, be more difficult to draw out from the under siding of the vessel, and consequently be more efficient in securing the sheathing thereto, and the nail at the same time require less force in being driven into the vessel's bottom, be equally as strong as the ordinary sheathing nails and still have considerable less weight of metal.]

34,535.—David Walker, of Newark, N. J., for Improved Self-Rocking Cradle :

I claim, first, The construction and arrangement, substantially as described, of the relief guides, c, in combination with pallets, a, and escapement wheel, b, in the manner set forth and for the purpose specified, when used in a self-rocking cradle, constructed as described.

Second, In combination with a self-rocking cradle, constructed as described.

Third, In combination with a self-rocking cradle, constructed as described, the automatic fan, k n m r, constructed and arranged as described and shown, and operated by the movement of the cradle, in the manner specified.

34,536.—G. W. Walker, of Boston, Mass., for Improvement in Sliding Grates :

I claim the arrangement and combination of the movable dog, C, with the sliding grate, A, and its supporting frame, B, the whole being o operate together as specified.

34,537.—J. H. Walker, of Worcester, Mass., for Improved Machine for Pricking Leather :

I claim, first, The combination of the holding plate, F, and pricking plate, F', with table, C, and its dovetailed guide, stands or projections, E E E' E', as and for the purposes set forth.

Second, The combination and arrangement of plates, F F', and tables, A C, with forked levers, H J, and springs, G G', substantially as set forth.

Third, The combination in the same machine of a perforated stationary table, having a holding plate above and a pricking plate below, with mechanism so combined with said plates that leather placed on the table and under the holding plate can be held by the upper plate while it is pricked by the points or awls in the lower plate, by simply depressing a foot lever, substantially as set forth.

34,538.—W. F. Warburton, of Philadelphia, Pa., for Improvement in Military Hats :

I claim the cape or curtain, D, and movable sweat band, C, when so combined and arranged that the sweat band shall serve to retain the cape in an elevated position and when moved shall permit the cape to fall, as set forth, for the purpose specified.

34,539.—H. H. Warden, of New York City, for Improved Ships' Armor Plates :

I claim an armor plate for ships composed of a wrought-iron frame imbedded within a cast-iron body, substantially as shown and described.

[The object of this invention is to obtain plates of cast iron for covering ships of war which, while they are liable to fracture like other cast-iron plates, do not fall off and leave a bare spot on the side of the ship.]

34,540.—Emanuel Wassenich, of Cincinnati, Ohio, for Improvement in Portable Ovens :

I claim constructing a portable army oven, A, of boiler iron, of the shape described, viz., semielliptically prismoidal, with arched ends, a a, and strengthened by ribs, B B, connecting hooks, H, and beams, C C, substantially as and for the purpose set forth.

34,541.—John Weldy, of Dayton, Ohio, for Improved Machine for Sawing Wood :

I claim the combination and arrangement of the rock shaft, G, arm, H, links, h h, and saw beam, J, constructed to operate substantially as described, for the purpose set forth.

And in combination with the links which support the saw beam, I claim the guide bar, i, substantially as described, for the purpose set forth.

34,542.—Anthony Werné, of Pittston, Pa., for Improved Apparatus for Making Vinegar by the Quick Process :

I claim the employment of the distributing shield, C, in combination with the tubes, b, and tub, B, as and for the purpose shown and described.

Having the bottom of the tub, B, provided with small tubes, a, as and for the purpose shown and described.

The tube, H, arranged and operating with the generator, A, as shown and described.

The combination with the generator of the condenser, J, constructed substantially as shown, and tube, I, as and for the purpose shown and described.

[This invention consists in a novel arrangement of air tubes for the escape of air, gases, and vapors from the acetifying vat in combination with the contrivances for distributing the liquid in the vat, whereby the distribution is effected very perfectly and efficient provision is afforded for the escape of the air gases and vapors. It also consists in a certain arrangement of a pipe for cooling the interior of the vat whenever it becomes necessary also in the employment, in connection with the apparatus of a condenser for the condensation of the vapors evolved in the process of manufacture, and the collection of the products of such condensation.]

34,543.—W. H. White, of Dubuque, Iowa, for Improved Roofing :

I claim, first, The roof constructed of the materials, and in the manner, substantially as described.

Second, The dovetail fastening, as described, for the purpose set forth.

Third, The combination of common salt, sand, coal, coal tar and coal ashes, to form a roof, in the manner specified.

54,544.—Thomas Wilson, of Silver Creek, Ill., for Improvement in Running Gear of Railroad Cars :

I claim the employment of tension springs between the trucks and their connecting rods, in combination with independent wheels, substantially as shown and described.

[This invention consists in the manner of connecting a set of car trucks together, in combination with the independent movement of the car wheels, whereby the friction in turning curves and switches, and the consequent wear and tear of the rails is greatly reduced, and a gentle and easy motion given to the cars, which neither alone will effect.]

34,545.—S. S. Bartlett, of Providence, R. I., assignor to himself and T. H. Dodge, of Washington, D. C., for Improvement in Harvesters :

I claim, first, Supporting the rear end of a drag bar, arranged to run on the ground at the side of the machine, with its rear end free to rise and fall, by means of an adjustable arm or lever, whose front end is supported by the axle or journal of the main wheels, and on the outside of the inner wheel, substantially as described.

Second, The combination with the inner end of the axle or journal of the main supporting wheels of a grass harvester, of an elevating arm or lever, whereby the rear end of its hinged drag bar can be raised and lowered together with the heel of the finger beam by the driver, from his seat on the machine, while the elevating arm or lever has a firm support, independent of the frame, substantially as described.

Third, The combination of the drag bar and compound lever arrangement with the main frame and finger beam of the machine, substantially as and for the purposes set forth.

34,546.—Frederick Chandler, of Charlestown, Mass., assignor to himself and C. A. Cousens, of Newton, Mass., for Improvement in Camp Stoves :

I claim, first, Forming a sectional stovepipe in such a manner that the sectional pieces, whether straight or tapering, shall be held together, and to the stove by flanges or other positive mechanical devices, to prevent their dismemberment from each other or from the stove.

Second, So combining a sectional stovepipe, constructed in the manner described, with a stove, as to permit the said sectional stovepipe to be packed and inclosed by the stove, as described.

34,547.—J. F. Drummond (assignor to C. T. Reynolds, F. W. Devoe and Charles Pratt), of New York City, for Improvement in Packing Cans for Transportation :

I claim the method of preventing the indentation leakage, and weakening of paint cans, shown and described.

[The object of this invention is to pack ordinary cylindrical sheet-metal cans, such as are used for holding turpentine, oil, varnishes, &c., in such a manner that they may be securely held in position within their box, and at the same time admit of being very expeditiously packed, the filling originally used, such as sawdust, paper, &c., between the cans being avoided.]

34,548.—James Easterly (assignor to himself and Dennis G. Littlefield), of Albany, N. Y., for Improvement in Stoves :

I claim a window or door for stoves, furnaces, and every character of heater, combining the properties of metallic gauze and of mica, or other transparent material, for the purpose specified.

34,549.—G. W. La Baw (assignor to himself and P. F. Campbell), of Jersey City, N. J., for Improvement in Springs for Carriages, Wagons, &c.:

I claim, first, The toggle joint bars, b b, in combination with the boxes, c c, containing the springs of india rubber, as and for the purposes specified.

Second, I claim the cushions or buffers, f f, of india rubber, applied to take the toggle joint bars, b b, in the manner and for the purposes set forth.

34,550.—T. S. Lambert (assignor to H. W. Hunt), of Peekskill, N. Y., for Improvement in Double Windows :

I claim the combination of light sash doors, hung to the inside stops of a window, with the movable stops, K K L, so that when the door is closed it will abut upon the outer window sash, making in effect a double window, as and for the purposes set forth and described.

34,551.—W. T. Pogue, of Vienna, Ind., assignor to George Hely, of Richmond, Ind., for Improvement in Apparatus for Holding Wagon Wheels while Loading :

I claim the arrangement of the rods, B E F, swivel, C, clevices, D D D D, in combination with the wheels, A A, the better to effect the purpose described, the whole being constructed substantially as described.

34,552.—A. J. Scoville and A. H. De Clerq, of Bloomington, Ill., for Improvement in Pistons for Steam Engines :

We claim the valve ring, with the holes opening against it through the flange of the piston head, and through the follower, constructed and operating substantially as described.

We also claim as our invention, the combination of the small holes through the flange of the piston head, and through the follower, against the edge of the outside rings, with the inside and outside piston rings, and the valve ring, and holes opening against it through flange of the piston head, and through the follower. the whole arranged and operating substantially as described.

34,553.—E. W. Seymour, of Centre Lisle, New York, assignor to himself and G. W. Gregory, of Binghamton, N. Y., for Improvement in Shifting Hinge, Joint or Congling Shafts of Wagons :

I claim a shifting hinge, joint or coupling, constructed in the following manner, to wit, the combination of the barrel, A, with the pivot, C, and slot, D, with the arm, H, and its shoulder, G, as and for the purposes described.

34,554.—J. L. Treat (assignor to Yale and Curtis), of New York City, for Improvement in Drawing Apparatus for Portable Vessels :

I claim the vessel, A, having an inner shell, B, fitted loosely within it and suspended from the cover of the same by a vertical spring, d, the said shell being open at the bottom and provided with an aperture, c, in the top, which is closed when liquor is drawn from the vessel, by a valve, j, actuated by the same pressure that forces the shell down and causes the liquor to flow from the spout of the vessel, when arranged to operate in the manner substantially as described.

RE-ISSUES.

1,277.—Henry Knight, of Jersey City, N. J., for Improvement in Mold for Molding Cement Pipes. Patented May 8, 1860 :

I claim, first, The use of a vertical stationary central core or its equivalent, substantially as and for the purpose set forth.

Second, The combination of the detachable collar, G, or its equivalent, and a flask or exterior mold, F d e, constructed with two different diameters, and with a shoulder, f, or its equivalent, for the purpose set forth.

Third, The use of the shouldered detachable base or bottom, E, substantially as and for the purposes set forth.

Fourth, The use of a detachable collar or tool, G, or its equivalent, for forming a right angle or nearly right-angle socket, within one end of the cement pipe, substantially as and for the purposes set forth.

Fifth, The use of an adjustable perforated centring table, in combination with a cement pipe machine, substantially as and for the purposes set forth.

Sixth, Producing by vertical molding, with means substantially such as described, sections of cement pipe, with external collars, and right angle or nearly right-angle sockets, as set forth.

Seventh, Removing the molded cement pipe from the machine, by raising it vertically, substantially as set forth.

1,278.—J. G. Perry, of South Kingston, R. I., for Improvement in Meat-Cutting Apparatus. Patented Feb. 26, 1850.

I claim, first, The use and employment of the studs, s s s, Fig. 3, with one or both of the discharge elements, L L, substantially as described and for the purpose set forth.

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Second, I claim combining the knives and space blocks with the case of a meat cutter in the manner substantially as described and for the purposes set forth.

1,279.—Sanford, Harroun & Co. (assignees by mesne assignments of G. F. Hebard, G. J. Hill and S. D. Rockwell), of Buffalo, N. Y., for Improvement in Printing Presses. Patented Aug. 7, 1860.

We claim, first, The combination of the spool or roller, C, or the equivalent thereof, which carries a roll of printing paper, or thin card board, which may be wound into a roll with feeding rollers, which have an intermittent feed movement, and the printing and numbering mechanism of a printing and numbering machine, substantially as described, so that the paper or card board may be run off from the roller and fed in by an intermittent movement of the feed rollers, and properly presented for printing and numbering coupon tickets from a continuous sheet of printing paper or card board, substantially as set forth.

Second, The combination and arrangement of the cutting mechanism with a roller or equivalent, carrying a roll of paper or card board, and the printing and numbering mechanism of a printing and numbering machine, so that coupon and other tickets may be printed, numbered and cut simultaneously from such printing paper or card board, substantially as described.

Third, In a machine for printing and numbering coupon tickets we claim, in combination with the printing mechanism for printing the tickets, making the numbering wheels adjustable horizontally, substantially as described, whereby the machine can be readily adapted to numbering tickets of different widths.

Fourth, In a machine for printing tickets from a roll or continuous sheet of printing paper or thin card board, we claim making the feed roller so as to act upon a portion of the width of the sheet instead of the whole width, whereby we are enabled to feed in thin sheets of printing paper or thin card board, in a smooth and even manner.

1,280.—Alexander Swift, of Cincinnati, Ohio, assignee by mesne assignments of Issachar Frost and James Monroe, of Albion, Mich., for Improvement in Mode of Separating Flour from Bran. Patented Feb. 27, 1849. Re-issued March 13, 1855. Again re-issued May 11, 1858.

We claim, first, The combination of the essential features severally described and severally numbered, 1 2 3 and 4 or their equivalents, substantially as described and for the purposes specified in the several numbers.

Second, We also claim the combination of the essential features severally described, and severally numbered 1 2 and 5, or their equivalents, substantially as they are described; the purpose of the combination being substantially as set forth in number 5.

Third, We also claim the combination of the essential features severally described, and severally numbered 1 2 and 6, or their equivalents, substantially as they are described; the purpose of the combination being substantially as set forth in number 6.

Fourth, We also claim the combination of the essential features severally described, and severally numbered 1 2 6 and 7, or their equivalents, substantially as they are described; the purpose of the combination being substantially as set forth.

Fifth, We also claim the combination of the essential features severally described, and severally numbered 1 2 4 5 6 and 7, or their equivalents, substantially as specified; the purpose of the combination being substantially as severally set forth.

1,281.—J. E. Brown and S. S. Bartlett, of Woonsocket, R. I., and T. H. Dodge, of Washington, D. C., assignees to said Brown and Bartlett, for Improvement in Grain and Grass Harvesters. Patented Jan. 2, 1855. Re-issued Jan. 1, 1861.

We claim, first, The combination of a hinged or yielding drag bar, I, or its equivalent, with the main frame and finger bar or cutter stock of a harvesting machine, in such a manner that as the frame is advanced the drag bar or its equivalent will be advanced, and that in its turn will draw forward the finger bar which supports the cutting apparatus, which is left free to rise or fall bodily, or at the heel end, while the outer end rests on a lower surface, without affecting the motions of the main frame.

Second, The use and employment in a harvesting machine of a yielding drag bar, or its equivalent, arranged on the inner side of the machine, in combination with hinging the heel of the finger bar to said drag bar, whereby the entire cutting apparatus is left free to rise or fall bodily, or either end thereof, independent of the other, and without affecting the motions of the main frame.

Third, Hinging the front elevated end of a drag bar to which the heel of the finger bar is connected in a harvesting machine, to the front inner side of the main frame, in combination with giving said drag bar a lateral support in rear of the axis of the main wheels, whereby the strain on the frame is divided, while the rear end of the drag bar is retained in proper position but left free to rise and fall independently of the main frame, for the purpose stated.

Fourth, Fastening the heel end of the finger bar which supports the cutting apparatus in a harvesting machine to a heel piece which in turn is hinged in a recess in the end of a yielding drag bar, whereby the cutting apparatus is properly supported and kept in position at the side of the machine, and yet left free to conform to the inequalities of the ground without affecting the motions of the main frame.

Fifth, The combination of the drag bar, I, with rock shaft, H′, and the front of the main frame, substantially as set forth.

Sixth, The use of a single draw or drag bar attached at its forward and elevated end to the machine by a connection, so that its rear end can rise and fall, as specified, in combination with a hinged or rigidly connected cutter stock or finger bar, for the purposes specified.

Seventh, Hinging the finger bar in a grass harvesting machine to a vibrating drag bar, or equivalent device, when said drag bar or equivalent device is used for the purpose of sustaining and supporting the cutting apparatus to the right of the path of the inner main wheel of the machine, and of allowing it to conform freely to the uneven surface of the ground while the machine is in operation.

1,282.—J. E. Brown, S. S. Bartlett, of Woonsocket, R. I., T. H. Dodge, of Washington, D. C., assignees of said Brown and Bartlett, for Improvement in Grain and Grass Harvesters. Patented January 2, 1855. Re-issued Jannary 1, 1861:

We claim, first, The combination of a floating folding finger bar with the frame of a grass harvesting machine, whereby, when the machine is in operation the cutting apparatus is left free to conform to the inequalities of the ground without affecting the motion of the main frame and is also capable of being raised and turned or folded up so as to facilitate the passage of the machine from place to place, or over fields of cut grass.

Second, The arrangement of a floating folding finger bar with the frame of a grass harvesting machine in such a manner that the attendant can freely approach said finger bar from the rear and turn up the outer end thereof with facility to pass stumps, stones, or through gates without tipping up or raising the carriage while the main weight of the finger bar is allowed to rest on the ground at the side of the machine, for the purposes stated.

Third, The combination of a stop, V, or any equivalent device for the purpose stated, with the heel of a floating folding finger bar and the frame of a grass harvester.

1,283.—J. E. Brown, S. S. Bartlett, of Woonsocket, R. I., and T. H. Dodge, of Washington, D. C., assignees of said Brown and Bartlett, for Improvement in Grain and Grass Harvesters. Patented January 2, 1855. Re-issued January 1, 1861:

We claim, first, The combination of the following elements in a grass harvesting machine, viz., a main frame, two supporting wheels to sustain said frame laterally and at the proper hight above the ground, a rigid tongue to draw and steady the machine by and a floating finger bar for the purposes stated.

Second, So combining, in a grass harvester, a floating finger bar, a a frame to support the driver, and the tongue or draft beam by which the machine is drawn forward as that the finger bar which supports the cutting apparatus can rise and fall freely at either or both ends without affecting the motion of said frame or tongue.

Third, The combination and arrangement in a grass harvesting machine of a frame to carry the driver, two wheels to support said frame, one at each side thereof, a tongue to draw the machine by and a double-jointed finger bar attachment, substantially as and for the purposes stated.

Fourth, Combining the floating finger bar with the frame of a grass harvesting machine so that said floating finger bar shall project entirely from the right side of the machine, substantially as and for the purposes stated.

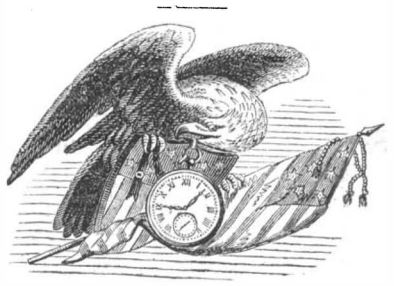
DESIGNS.

1,542.—E. J. Ney (assignor to the Lowell Manufacturing Company), of Lowell, Mass., for five Designs for Carpet Patterns.

1,547.—I. B. Woodruff, of Winchester, Conn., for Design for a Clock Case.

NOTE.—In the above list of patents, issued on the 25th ult., we recognize the names of THIRTY-TWO patentees whose specifications and drawings were prepared at this office.—EDS.

PATENTS FOR SEVENTEEN YEARS.



The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

W. F, Q., of Del.—Though the velocity of the earth's surface at the equator is greater than that of a cannon ball, it does not follow that the centrifugal force is sufficient to stop the ball.

J. H. S., of Nevada Ter.—For your high fall of 100 feet, we think a turbine would be the best kind of wheel. The wheel of J. E. Stevenson yielded the best results at the Philadelphia trial. Address him at the Novelty Iron Works, New York, for all the information you need. 33,000 lbs. of water falling one foot per minute yields one horse power; a cubic foot of water weighs 62½ lbs. Consequently, to find the horse power of your fall, multiply the number of cubic feet running in your stream per minute, by the fall in feet, and the product by 62½, and divide by 33,000. It is impossible to obtain the whole power for use on machinery as some of the water will leak, and the power is wasted in other ways. Mr. Stevenson's wheel yielded 87 per cent, which we believe is the largest proportion that has ever been obtained.

A. L., of Conn.—We do not engage in the business of procuring copyrights. When you are in this city you had better apply to some leading book publishers for information on the subject.

J. V. R., of N. Y.—You will find oreide of gold described on page 200 Vol. IV., (new series) SCIENTIFC AMERICAN.

H. L., of N. J.—Morrison & Carr, of the New York city pottery, Thirteenth street, manufacture porous cups for galvanic batteries, and have done so in large quantities for the past three years.

D. W. B., of N. Y.—So far as we know, neither pot nor pearl ash are manufactured by boiling in a vacuum pan. We do not see what advantage could be secured by such a method of evaporation, as no saving of fuel is effected by the use of a vacuum pump in concentrating fluid.

W. S. P., of Mass.—The best method of removing grease from the leather of pulleys, is to soak it for a short period in cold, strong soap suds, then squeeze and dry it.

D. G. W., of Vt.—Sheet copper will be more durable for your chimney top, than galvanized sheet-iron.

S. B. W., of N. Y.—It is not supposed that all flint is composed of the coprolites of whales, only that the nodules in chalk are.

D. S., of Wis.—You say there is a prevalent idea in your neighborhood that fence posts set in the ground with the little end down, will last longer than with the large end in the ground, and you ask our opinion in regard to its correctness. We have no opinion on the subject, because we have no grounds for forming one. We attach very little weight indeed to the fact that such a notion prevails in your community, from the disposition of people to take such notions one from another, without any examination. If you will set 100 posts, one half of them with the large end in the ground, and the other half in a reversed position, and will repeat the experiment with various kinds of wood, cut at different seasons of the year, and set in different kinds of soil, and will write a plain account of the investigation, we shall be pleased to publish it in the SCIENTIFIC AMERICAN.

W. S., of C. W.—We have had a great deal of trouble from air accumulating in lead pipes where the pipes passed over an elevation. We think your best plan would be to attach a suction pump to the lower end of your pipe. You would generally be able to draw the air out from the bend in your siphon.

SPECIAL NOTICE—FOREIGN PATENT.—The population of Great Britain, is 30,000,000; of France, 35,000,000; Belgium, 5,000,000; Austria, 40,000,000; Prussia, 20,000,000; and Russia, 60,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. Nearly all of the patents secured in foreign countries by Americans are obtained through our agency. Address Munn & Co., 37 Park row, New York. Circulars about foreign patents furnished free.

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Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, March 5, 1862:—

J. H., of Scotland, $20; L. W., of Conn., $43; F. E. B., of N. J., $45; G. and M., of N. Y., $20; C. P. B., of Conn., $20; A. C., of Mass., $20; F. G. L. S., of Wis., $20; A. B., of Conn., $40; W. G., of Ind., $15; J. S. H., of Cal., $50; T. C., of R. I., $75; W. F., of Hanover, $30; J. B. S., of Prussia, $15; R. H., of N. Y., $28; J. McH., of O., $15; D. C. D., of Ind., $25; F. G. J., of L. I., $225; R. J. S., of N. Y., $30; H. H. E., of Conn., $15; J. H. I., of Ill, $15; B. F. S., of Vt., $15; G. and C., of Conn., $15; L. C. C., of Mass., $20; C. G. M., of Vt., $15; J. H., of N. J., $25; M. S. S., of O., $15; S. T. D., of N. J., $15; J. McH., of O., $15; E. D. W., of Pa., $50; J. P. W., of N. Y., $25; C. E. S., of Md., $45; D. G., of N. Y., $20; D. B., of Conn., $20; A. B., of N. Y., $45; C. S., of N. Y., $20; C. O. P., of Mass., $45; F. C., of N. H., $20; J. F. H., of Cal., $10; E. S. N., of Iowa, $15; C. H. and W. G. D., of Pa., $15; T. H. A., of Ill., $20; J. I., of Pa., $15; W. H. L., of Mass., $15; C. G. P., of Ind., $15; A. S. L., of N. Y., $125; R. and Co., of N. Y., $100; H. O. P., of Mass., $15; W. B., of Iowa, $15; A. R., of Cal., $15; W. O., of N. Y., $15; J. H. R., of Ill., $15; G. and J., of R. I., $15; P. S. C., of N. Y., $15; I. McD., of Iowa, $15; J. K. H., of Ind., $15; W. P., of Md., $15; D. W. H., of Cal., $25; J. W. B., of N. Y., $25; J. A. W., of N. Y., $25; T. V., of Cal., $20; J. B. S., of Conn., $32; J. H., of N. Y., $20; S. and R., of N. Y., $45; E. and A. B., of N. Y., $20; C. B. S., of Mass., $45; A. O. C., of N. J., $20; W. R. B., of Mich., $20; W. and F., of Wash. Ter., $298; D. W. H. of Cal., $20; L. S., of Mass., $15; B. S. and J. M., of Pa., $25; J. R. G.,of Ill., $10; P. and B., of Mass., $15; L. W. P., of Mass., $53; J. M., of N. Y., $15; W. H., of Iowa, $15; A. H. and J. A. B., of Pa., $15; J. H., of O., $15; W. H, P., of N. Y., $15; J. S. T., of N. Y., $10; S. E. S., of N. Y., $15; W. C., of O., $15.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Feb. 26, to Wednesday March 5, 1862:—

L. W., of Conn.; J. B. S., of Conn.; H. M. H., of Pa.; J. H., of Cal.; E. D. W., of Pa., two cases; R. J. S., of N. Y.; L. W. P., of Mass.; J. H. V., of Mass.; J. P., of Ind.; W. B. B., of Mich.; B. T. and S. M., of Pa.; R. H., of N. Y.; W. O. H., of Pa.; T. C., of R. I., three cases; J. A. W., of N. Y.; J. W. B., of N. Y.; E. P., of Cal.; A. B., of Conn.; J. P. W. of N. Y.; J. H. I., of Ill.; J. H. of N. J.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design atents, when two good drawings are all that is required to accompany he petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when he time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our recention of their funds.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

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For further particulars, address—

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Publishers SCIENTIFIC AMERICAN,
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A DRY COMPOSITION FOR FILLING FIRE-PROOF Safes.—Believed to be the best ever discovered. Patent Right for sale. Address J. JENKINS, No. 480 North Fifth street, Philadelphia, Pa. 1*

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NEW YORK OBSERVER FOR 1862.—IN ASKING the aid of all who may desire to extend the circulation of the *New York Observer*, it is proper for us to state distinctly the position it occupies with reference to the present condition of public affairs in our beloved country.

Having always maintained the duty of good citizens in all parts of the land to stand by the Constitution, in its spirit and letter, when that Constitution was assailed and its overthrow attempted, we accordingly at once gave a cordial support to the Government in its patriotic endeavor to assert its lawful authority over the whole land. Believing secession to be rebellion, and when attempted, as in this case, without adequate reasons, to be the highest crime, we hold

1. That the war was forced upon us by the unjustifiable rebellion of the seceding States.

2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.

3. That every citizen is bound to support the Government under which he lives, in the struggle to reestablish its authority over the whole country.

4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions: and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.

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The state of the country renders it important for us and esirable for the churches, that a new and earnest effort be made to extend the principles of good government and sound religious truth into all the families of the land. In every neighborhood there must be some who do not now take a religious newspaper, and who might with a little exertion be induced to subscribe.

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Improved Mode of Fastening Armor Plates on War Vessels.

It is difficult to realize the enormous weight of iron, 4½ to 5½ inches in thickness, of sufficient extent to cover the sides of a great ship; and it is still more difficult to fasten such plates to a vessel so as to hold them securely while the vessel is rolling and pitching in a heavy sea. And if to this difficulty is added the necessity of so securing the plates that they will bear the concussion of the heaviest cannon balls fired against them, the problem is certainly one of the most formidable that has ever been presented to engineers. Our inventors have entered boldly upon this task and it is our intention to present an illustrated history of their efforts in its acomplishment.

The plan here illustrated consists essentially in rabbeting the plates together at their edges, and then passing bolts through both plates where they lap, and through the sides of the ship; securing the bolts upon the inner side by nuts.

Fig. 1 is a view of a portion of the side of a vessel partly covered with plates, as proposed. Fig. 2 is a vertical section of the side, and Fig. 3 is a horizontal section.

The plates are represented in a vertical position in two series, the upper series, B B B, being, say 16 feet long, 4 feet wide, and of the desired thickness; the lower series of the same width and thickness, but only 8 feet long, or of sufficient length to clothe the side of the vessel to the desired depth. The edges of the plates are rabbeted as shown in Figs. 2 and 3, and tapering bolt holes are drilled through them at the laps, and through the side, A, of the iron ship. As the bolts, D D, are made tapering they can be driven flush with the outside of the plates; leaving no projecting head to be knocked off by the enemy's shot. The inner ends are secured by nuts.

The plates are placed together and the holes drilled straight through them, but before the bolts are driven, a thin piece of packing, E E, consisting of sheet iron or other suitable material is placed in the joint so that as the bolts are driven home, they may draw the plates together with great force, thus forming a water-tight joint and so binding the plates that they will materially strengthen the sides of the ship.

At the upper edge of the ship's side, a hook, C, is riveted to the inner side of the plate, in such manner that it may catch over the edge, as shown; thus securely fastening the upper edges of the ship's side, and the armor plate securely together.

Port-holes, Z Z, are cut through the plates in the proper positions. It is believed that this is a more simple and effective mode of securing iron armor plates than any heretofore devised, and that it presents the great advantage of making the joints perfectly water tight.

The patent for this invention was granted Oct. 22, 1861, and further information in relation to it may be obtained by addressing the inventor, John B. Love at the southeast corner of Front and Market streets, Philadelphia, Pa.

Fig. 2

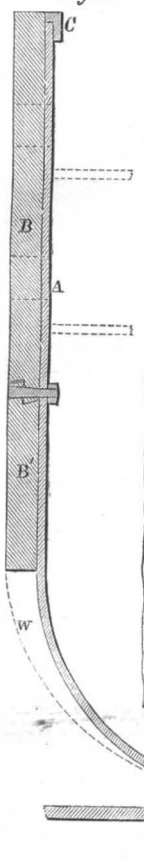


Fig. 1

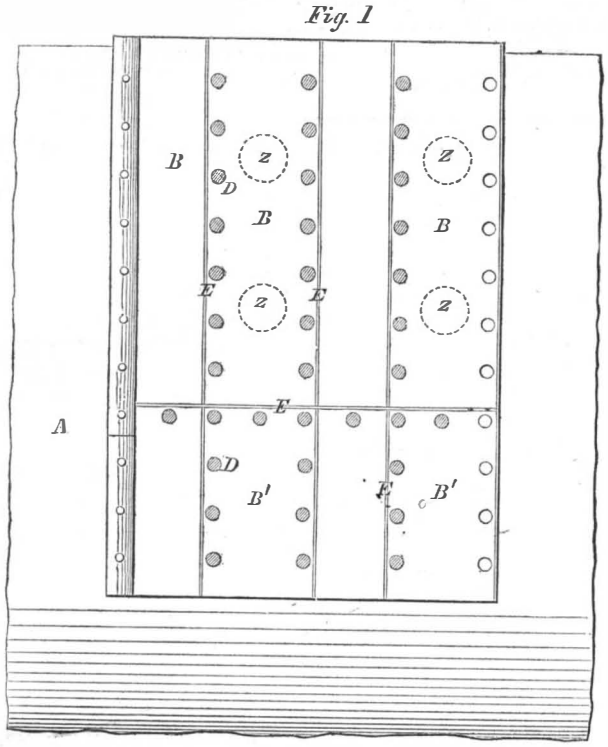
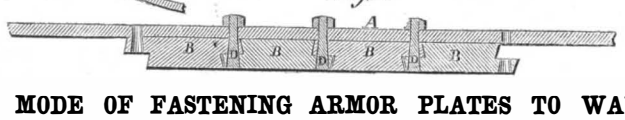


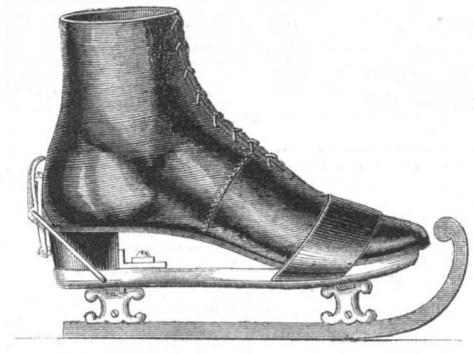
Fig. 3

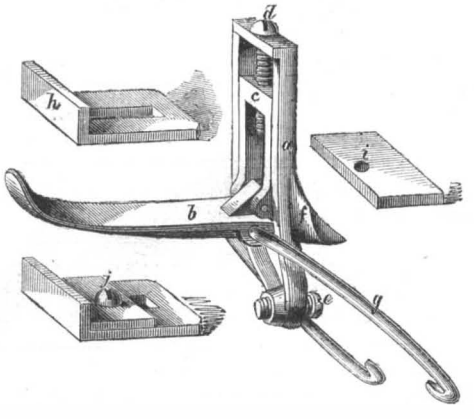


LOVE'S MODE OF FASTENING ARMOR PLATES TO WAR VESSELS.

PLIMPTON'S SKATE FASTENER.

The fashion of skating continues to prevail, and we suppose as long as the art is popular improvements in





skates and skate fastenings will continue to come from the fertile brains of our inventors. The invention here illustrated is of unusual novelty, and displays more than ordinary ingenuity. It is a device for fastening the skate to the foot in a remarkably secure manner, and is instantaneous in its action.

A block, *a*, of brass, is fashioned to fit against the boot or heel, with a claw or projection, *f*, to enter the groove above the heel. The block, *a*, is secured to the skate by a bent rod, *g*, in such manner that the rod may be instantly tightened to bind the skate to the heel of the boot, and instantly loosened to take off the skate. To effect this the rod is connected at its ends by pivots to each side of the skate, while at its middle it passes loosely through a lever, *b*. This lever is pivoted at the end to a brass block, *c*, which is connected by the screw, *d*, to the block, *a*. It will be seen that when the lever, *b*, is turned up in the vertical position shown in Fig. 1, the rod, *g*, is tightened, and the skate is bound firmly to the boot heel, while by simply turning the lever down, the rod, *g*, is loosened and the skate drops off.

The fastener is adjusted to heels of various hights by varying the hight of the block, *c*, by means of the screw, *d*.

The heel is prevented from sliding forward on the skate by the block, *h*, which is secured to the skate by a set screw, *j*, passing through a long slot, in order that the position of the block upon the skate may be varied to suit boot heels of different sizes. A plate, *i*, is placed across the block, *h*, above the slot, and through this the set screw passes. By the screw, *e*, the fastener is adjusted to the slope of the heel.

The toe strap is made adjustable in any approved mode, and all of the adjustments are arranged by the skater before leaving the house, so that upon arriving at the ice the skate can be attached in one second.

Beside its unparalleled rapidity of operation this fastener has the advantage of dispensing with a strap over the instep, which is uncomfortable and injurious, from its compressing the foot and obstructing the circulation of the blood. As this fastener takes hold of the upper surface of the heel it prevents the tendency to tear the heel apart, and it holds the skate with remarkable security. This fastening may be applied to most of the skates in use.

The patent for this invention has been ordered to issue, and the claim will undoubtedly appear in our next number. Further information in relation to the invention may be obtained by addressing the inventors, H. R. and J. S. Plimpton, at No. 145 Tenth street, corner Fourth avenue, New York City.

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